

# PACIFIC SEABIRDS



A Publication of the Pacific Seabird Group

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# PACIFIC SEABIRD GROUP

Dedicated to the Study and Conservation of Pacific Seabirds  
and Their Environment

The Pacific Seabird Group (PSG) was formed in 1972 due to the need for better communication among Pacific seabird researchers. PSG provides a forum for the research activities of its members, promotes the conservation of seabirds, and informs members and the public of issues relating to Pacific Ocean seabirds and their environment. PSG members include research scientists, conservation professionals, and members of the public from all parts of the Pacific Ocean. The group also welcomes seabird professionals and enthusiasts in other parts of the world. PSG holds annual meetings at which scientific papers and symposia are presented; abstracts for meetings are published on our web site. The group is active in promoting conservation of seabirds, include seabird/fisheries interactions, monitoring of seabird populations, seabird restoration following oil spills, establishment of seabird sanctuaries, and endangered species. Policy statements are issued on conservation issues of critical importance. PSG's journals are *Pacific Seabirds* (formerly the PSG *Bulletin*) and *Marine Ornithology*. Other publications include symposium volumes and technical reports; these are listed near the back of this issue. PSG is a member of the International Union for Conservation of Nature (IUCN), the Ornithological Council, and the American Bird Conservancy. Annual dues for membership are \$30 (individual and family); \$24 (student, undergraduate and graduate); and \$900 (Life Membership, payable in five \$180 installments). Dues are payable to the Treasurer; see the PSG web site, or the Membership Order Form next to inside back cover.

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## *Pacific Seabirds*

*Pacific Seabirds* publishes short peer-reviewed articles, reports of ongoing work, conservation news, and other items of importance to conservation of seabirds in the Pacific Ocean. The journal is published twice a year in spring and fall. Materials should be submitted to the Editor, except that conservation-related material should be submitted to the Associate Editor for Conservation. Information for contributors to *Pacific Seabirds* is published in each Fall issue. Back issues of the *Bulletin* or *Pacific Seabirds* are posted on the group's web site or may be ordered from the treasurer (see Membership/Order Form next to inside back cover for details). Submission deadlines are April 1 for the spring issue and October 1 for the fall issue; manuscripts may be submitted at any time.

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## *Marine Ornithology*

*Marine Ornithology* presents peer-reviewed contributions concerning international seabird science and conservation. The journal is published two times a year. It is available on its web site or by subscription. The journal is supported by a partnership of global seabird societies, including the Pacific Seabird Group (PSG), African Seabird Group, Australasian Seabird Group, the Seabird Group (U.K.), Dutch Seabird Group, and Japan Seabird Group. For further information see [www.marineornithology.org](http://www.marineornithology.org)

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# SPECIAL ACHIEVEMENT AWARD

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The Pacific Seabird Group occasionally honors outstanding contributors to seabird science and conservation with Lifetime Achievement or Special Achievement awards. The Special Achievement Award recognizes an individual who has achieved significant, exemplary accomplishment for seabird research, conservation, and/or education. Below is our tribute to Ed Melvin, the 2007 recipient of the Special Achievement Award.

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## SPECIAL ACHIEVEMENT AWARD: EDWARD F. MELVIN

Katie O'Reilly and Vivian Mendenhall

The Pacific Seabird Group presented its Special Achievement Award to Edward F. Melvin on 10 February 2007, at its annual meeting in Asilomar, California. The award was given in recognition of significant and original contributions to the conservation of Pacific seabirds. Ed is directly responsible for saving the lives of hundreds of thousands of seabirds. His research and collaborations are reducing seabird bycatch in fishing gear from Alaska to Antarctica.

Ed Melvin is the Marine Fisheries Research Scientist for Washington Sea Grant, at the University of Washington's School of Aquatic and Fisheries Sciences in Seattle. The principal focus of Ed's research is to develop and implement seabird avoidance gear, in order to reduce seabird mortality in commercial net, trawl, and hook-and-line fisheries. His first project addressed seabird bycatch in the driftnet fishery for salmon (*Oncorhynchus* spp.) in Puget Sound, Washington; he went on to a series of projects on the demersal longline fishery in the North Pacific and Bering Sea, where bycatch has included the endangered Short-tailed Albatross (*Phoebastria albatrus*). Recently his work has expanded to the southern hemisphere, where declines in many albatross populations are ascribed to incidental mortality in fisheries.

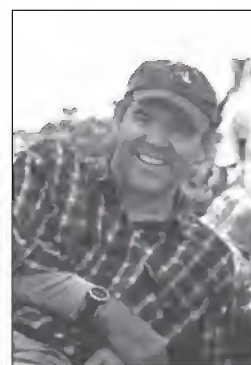
Ed grew up in New York City. After attending a technical high school, he knew he didn't want to be an engineer. He began college at the University of

Pennsylvania as a pre-medical student. He saw the light in his junior year when one of his professors developed a marine biology curriculum. After he received his BA in Zoology, he moved to the West Coast and got his MS in Fisheries Science from Humboldt State University in 1980. He had his eye on a Sea Grant position in nearby Eureka, but instead got a position with that program in Monterey Bay, at Moss Landing Marine Labs. After working on a variety of projects, including wetland restoration and handling of troll-caught salmon and albacore (*Thunnus alalunga*), Ed became the Marine Fisheries Specialist with the Washington Sea Grant Program in Seattle in 1990. He has since received over two million dollars in funding to create, modify, and test seabird avoidance gear. Ed has also served a critical role in ensuring implementation of new gear, by cooperating with fishers during testing and development, educating them on using the new gear, and by working with local, state, and federal agencies on developing regulations and performance standards for reducing seabird bycatch.

Solving seabird bycatch problems is a challenge. Birds are caught by swimming among fish schools near a net, attacking baited hooks, or trying to scavenge scraps near fishing gear. The goal is to keep birds away from fishing gear or move it quickly out of their reach. Effective deterrents vary greatly with the fishery, depending on fishing gear, ves-

sel size, feeding guilds of seabirds, wind and sea conditions, and the demands of fishing operations. Each fishery has its own issues—deterrents that work in one fishery may be ineffective or dangerous in another. Biologists began documenting bycatch and deterrents in longline fisheries in the 1980s; the first streamer line deterrent (tori line) was developed by Japanese fishers, and it was required in parts of the Southern Hemisphere by the mid-1990s. Research had also begun in the northern hemisphere, including Norway. However, many studies were limited in scope or did not lead to effective regulations—and none applied to the North Pacific.

Ed received his initiation into bycatch problems in Puget Sound. Gillnets for salmon were catching Common Murres (*Uria aalge*) and Rhinoceros Auklets (*Cerorhinca monocerata*)—over 3500 birds in 1994 alone. From 1994 through 1996, Ed's group tested deterrents such as conspicuous net panels and audible "pingers" while recording seabird numbers and bycatch. The industry supported Ed's recommendations; the state of Washington now requires visible mesh





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Gillnetter in Prince William Sound. Net is suspended in water below the white floats. Net is being retrieved over roller on the bow, as fisherman removes the catch. (Photo V. Mendenhall)

in the top portion of gillnets for non-treaty fishers. (Regrettably, the Treaty Tribes and Canada, which participate in the same fishery, have no requirements for reducing seabird bycatch.)

Ed turned next to seabird bycatch in the huge Alaskan longline fishery. More than 1800 vessels, from skiffs to catcher-processors, harvest Pacific cod (*Gadus macrocephalus*), halibut (*Hippoglossus stenolepis*), and other species by deploying hooks on the bottom of the ocean. An average of 14,000 seabirds was caught incidentally in Alaskan longlines each year between 1993 and 1999. The majority were Northern Fulmar (*Fulmarus glacialis*) and gulls (*Larus* spp.). However, the greatest concern was the highly endangered Short-tailed Albatross (*Phoebastria albatrus*); fisheries are subject to interruption or closure if too many endangered Short-tails are caught. The National Oceanographic and Atmospheric Administration (NOAA) issued preliminary regulations to reduce seabird bycatch in 1997, but there had been no research on deterrents in Alaska.

In 1999 and 2000, Ed and his collaborators evaluated bycatch deterrents on

Alaskan longliners, comparing bycatch on vessels with four types of deterrents and without deterrent gear. The most effective deterrent proved to be a pair of tori lines behind each vessel, which kept more than 90% of seabirds away from longline hooks. Final regulations on bycatch reduction by large longline vessels were adopted by NOAA in 2004. Overall seabird bycatch rates were reduced by almost 80%, and no take of Short-tailed Albatrosses has been observed for ten years.

Ed is not one to leave a problem with loose ends. He went on to study deterrents for

small longliners, since methods used on large vessels may not work on small ones. The result was a new requirement for longliners of 26–55 (8–17 m) to use a single tori line; they also are allowed to fish without a deterrent in sheltered waters that have few vulnerable birds. Weighted longlines cause the hooks to sink rapidly, but dangling weights can be dangerous on fast-moving gear; Ed's group has recently evaluated a new type of longline with lead integrated into its weave. In the past two years Ed has begun evaluating potential deterrents for the Alaskan trawl fishery, in which seabirds are taken incidentally in nets and through collisions with cables. He has also begun assessing the potential for interactions with albatrosses and other seabirds by the hook-and-line and trawl fishing fleets of Washington, Oregon and California.

Ed's newest work focuses on the Southern Hemisphere. Many albatross populations have been declining sharply in the southern oceans since bycatch in longline vessels began. The Commission on the Conservation of Antarctic Marine



Setting gillnet in Puget Sound, with white "bird panels" in upper portion. Normal monofilament net appears darker on drum in foreground, and it hangs in water below the "bird panel." (Photo E. Melvin)

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Living Resources (CCAMLR) started requiring vessels to use deterrents as early as 1992; Ed's group recently joined them to review the effectiveness of current methods. In 2008 Ed began research to improve deterrents on pelagic longliners in the mid-southern latitudes. Hooks that target tuna (*Thunnus* spp.) and other fish are suspended in mid-water and sink slowly, and thus require different deterrents than in high-latitude demersal longlining. During a pilot project off South Africa, Ed modified the tori lines that the vessel was already using. His new version made a good impression: "the difference . . . was dramatic (a collective gasp from the crew)" (Melvin et al. 2009:6).



Trawler in Alaskan fishery. Net is being retrieved; "cod-end" full of fish is lying on water and moving up ramp at stern of vessel, and is surrounded by seabirds. (Photo E. Melvin)



(Above) Longliner with two streamer (tori) lines rigged astern. (Below) A pair of tori lines as viewed from stern of vessel. Seabirds avoid the tori lines and only gather behind the deterrents, but at that point the longline fishing gear is too deep for surface-feeding birds to reach the hooks. (Photos: above, E. Melvin; below, G. Balogh/U.S. Fish and Wildlife Service)



Ed Melvin, more than anyone else, is responsible for changes in the way seabird bycatch problems are viewed by fishers and agencies. His contributions have gone far beyond the design of new deterrent gear. His success has been due especially to the unique organization of his projects, which combine rigorous science, collabora-

tion with fishermen, and consultation with agencies. He recognized early that collaboration of researchers and fishers is mutually beneficial to both. His group incorporates the observations and ideas of fishers into the team's own insights. (Fishers dislike catching birds, often from concern about the birds, but especially because bycatch interferes with catching fish.) Potential new deterrents are then tested during commercial fishing operations, and he can then recommend gear that not only is effective in reducing seabird bycatch, but also is safe for fishers and does not reduce their harvest of target fish. Because fishers have contributed to practical solutions, they "buy into" the innovations and sometimes adopt new deterrents before they are legally required.

At the same time, Ed and his colleagues have advanced the standard of scientific protocols for evaluating deterrents. He insists on rigorous experimental design, including a large sample size that covers various deterrents (including none), an extensive area, and various weather conditions. Studies of this scale are made possible by their close collaboration with the industry and federal observers. Because of Ed Melvin's work on seabird bycatch over the past two decades, regulations are continually updated, and seabird mortality in many



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fisheries is declining. And if this were not enough, Ed produces educational videos and brochures and has co-edited a symposium on bycatch.

PSG honors Ed Melvin for his leadership of practical efforts to conserve seabirds during this era of industrial harvesting of the seas.

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(Right) Ed collaborates with a longliner crew, cutting squid for bait. (Photo G. Balogh/U.S. Fish and Wildlife Service)

(Above) Bob Day presents PSG's Special Achievement Award to Ed Melvin, 10 February 2007. (Photo V. Mendenhall)



# CONSERVATION REPORT

Compiled by Craig Harrison

## WORLD'S LARGEST MARINE SANCTUARIES ESTABLISHED IN U.S. TROPICAL PACIFIC

PSG wrote the chairman of the Council on Environmental Quality in October 2008 to express strong support of expanding Marine Conservation Management Areas adjacent to Johnston Atoll, Howland Island, Baker Island, Jarvis Island, Kingman Reef, Palmyra Atoll, Wake Island, and Rose Atoll (*Pacific Seabirds* 35:9, 2008). We noted that many of these islands support seabird colonies, including Black-footed Albatrosses (*Phoebastria nigripes*), Sooty Terns (*Sterna fuscata*), Gray-backed Terns (*S. lunatus*), Brown Noddies (*Anous stolidus*), Black Noddies (*A. tenuirostris*), Blue Noddies (*Procelsterna cerulea*), White Terns (*Gygis alba*), Red-tailed Tropicbirds (*Phaethon rubricauda*), Masked Boobies (*Sula dactylatra*), Red-footed Boobies (*S. sula*), Wedge-tailed Shearwaters (*Puffinus pacificus*), Christmas Shearwaters (*P. nativitatis*), Audubon's Shearwaters (*P. lherminieri*), and Polynesian Storm-Petrels (*Nesofregetta fuliginosa*). PSG emphasized that this White House initiative was important to protect seabird colonies and the food upon which the birds rely. These tropical oceanic islands and the surrounding waters are remote from human populations; however, they need to be protected against increasing risks from industrial fishing and the rats that fishing vessels may inadvertently carry.

The efforts of PSG and a broad conservation community bore fruit. In early January, President Bush used his authority under the 1906 Antiquities Act to designate three new monuments in remote areas of the Pacific near US territories, encompassing more than 500,000

km<sup>2</sup>. The president had previously designated the Papahānaumokuākea Marine National Monument in Hawaii, encompassing 364,000 km<sup>2</sup> of ocean. Most of the monuments extend 50 nautical miles out from each small island. The Marianas Marine National Monument is more than 247,000 km<sup>2</sup>, protecting areas around both the Marianas Trench and three small uninhabited islands that are rich in marine life. The Pacific Remote Islands Monument is 224,000 km<sup>2</sup> and protects a string of tiny uninhabited islands often called the Line Islands. The Rose Atoll National Monument protects coral reefs and a lagoon that are home to the region's largest concentration of nesting sea turtles, birds, and giant clams.

## BIRDLIFE INTERNATIONAL MAY DOWNLIST LAYSAN ALBATROSS

In mid-November 2008, BirdLife International began a process to downlist the Laysan Albatross (*Phoebastria immutabilis*) from the status of "vulnerable" to "near threatened." The group is taking comment on this proposed change. BirdLife International had listed the Laysan Albatross because it believed the population was declining a few percentage points per year over the 1990s on average; BirdLife's biologists predicted that such declines would result in greater than a 30% decrease over a three-generation period (84 years, based on a generation length of 28.5 years). The predicted declines did not materialize. In fact, numbers at breeding colonies have increased since the early 2000s. Some biologists were concerned that the data

were insufficient to justify a "vulnerable" listing, and that the status did not take into account the fact that Laysan Albatrosses often skip breeding in some years, due to oceanographic or other conditions. Thus short-term declines of nest counts should not be the sole basis for predicting the species' population trajectory.

## PSG AGAIN OPPOSES DELISTING OF MARBLED MURRELET

In June 2008, separate decisions by two federal courts—a U.S. District Court judge in Washington, D.C. and the 9th U.S. Circuit Court of Appeals—denied efforts by the timber industry to remove the Marbled Murrelet (*Brachyramphus marmoratus*) from protection under the Endangered Species Act (ESA). However, in early October 2008, in response to another petition by American Forest Resource Council, the Carpenters Industrial Council of Douglas County, Oregon, and an individual, USFWS found that delisting the marbled murrelet might be warranted. The agency has initiated a status review of the species and intends to review its range-wide status. When the review is complete, USFWS will issue a 12-month finding on the petition. More details of these developments are in *Pacific Seabirds* 35:6, 2008.

PSG provided extensive comments to USFWS on the status of the Marbled Murrelet in December 2008, thanks to Kim Nelson, Bill Ritchie, Greg Balogh, Alan Burger, David Lank and Doug Bertram. We expressed extreme concern about the future of the Marbled Murrelet's population in Washington, Oregon, and California. We stated that removal of

## CONSERVATION REPORT

the tri-state population from the federal Endangered Species List is not appropriate, considering its current status in those three states, as well as threats to the entire population throughout its range. PSG recommended that the tri-state Discrete Population Segment of Marbled Murrelet continue to be listed, and furthermore, that it should be reclassified from threatened to endangered. Otherwise, it is likely to become extinct within its tri-state range in the foreseeable future. PSG also expressed its concern about the future of the British Columbia and Alaska populations, since they seem to be declining as well. PSG recommended that, at the very least, the USFWS should list Marbled Murrelets as a species of special concern in British Columbia and Alaska, and should fund research on population declines and threats to the species. With their low reproductive rates and declining populations, murrelets in British Columbia (BC) and Alaska may not be able to recover quickly from the variety of perturbations that plague them. Proactive and immediate action is needed to prevent these populations from becoming threatened (Alaska) or endangered (BC).

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### CALIFORNIA CONCLUDES THAT BROWN PELICAN HAS RECOVERED

On 5 February 2009, the California Fish and Game Commission voted unanimously to remove the Brown Pelican (*Pelecanus occidentalis*) from the list of species considered to be endangered by the State. This is the first species that the state of California has ever deemed to have recovered from endangered status.

The delisting decision came more than three years after the Endangered Species Recovery Council (ESRC) filed separate petitions with federal and California agencies to declare that the California Brown Pelicans has recovered (*Pacific Seabirds* 33:56, 2006). ESRC filed its petitions in December 2005, with

the statement that this would preserve the integrity of the federal and state endangered species acts, because those laws should focus on species that are actually in current danger of extinction. The ESRC noted that wildlife agencies should have recognized long since that this iconic coastal seabird has recovered, and indeed that its population has now exceeded historic levels.

USFWS proposed to remove the Brown Pelican from the federal endangered species list via an announcement in the February 2008 *Federal Register*. PSG filed comments supporting federal delisting in April 2008, and no conservation organization has opposed delisting. It is anticipated that the species will be formally removed from the federal list in mid-2009. The delisting and acknowledgement of success with this species would have never happened without the support of Bill Everett and David Ainley.

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### ARE KITTLITZ'S MURRELETS ENDANGERED UNDER ALASKA LAW?

The Center for Biological Diversity (CBC) petitioned the Alaska Department of Fish and Game in early March 2009 to list the Kittlitz's Murrelet (*Brachyramphus brevirostris*) under Alaska's endangered species law. CBC petitioned USFWS for federal ESA listing eight years ago. That agency has determined that listing of the Kittlitz's Murrelet is "warranted," but that the action is "precluded" due to budgetary or staff constraints. CBC states that Kittlitz's Murrelet populations in Alaska have fallen 80% to 90% during recent decades, although USFWS notes that very little is known about the species. The declines may be associated with accelerated glacial retreat and reduced ice cover. The species nests on mountains in Alaska and Siberia, especially in Prince William

Sound, Cook Inlet, and the Bering and Chukchi seas.

Alaska's endangered species law was enacted in 1971, and few species have ever been listed under it. Alaska law requires a determination that a species has declined so much that its continued existence is threatened. If such a determination is made, the law requires habitat protections. Alaska law has much less enforcement power than the federal law and allows for only a single classification, "endangered." Alaska's law also has the category "species of special concern," which may be similar to "threatened" in other states. The Alaska statute does not mandate critical habitat designation, does not require consultation between agencies before development permits are issued, and imposes no deadlines. Nevertheless, CBC is hoping that the state will increase protection of Kittlitz's Murrelet habitat by controlling vessel traffic in Prince William Sound, Cook Inlet, and other glacier-influenced waters. It also wants a reduction of bycatch in gillnet fisheries and fewer oil spills. PSG has written the Alaska Department of Fish and Game and stated that it believes listed is warranted. In addition, USFWS may soon take steps to list the species under the federal ESA.

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### USFWS PROPOSES ESA PROTECTIONS FOR 7 PENGUIN SPECIES

In mid-December 2008, USFWS proposed listing seven penguin species as endangered or threatened under the ESA. Penguins occur in the Southern Hemisphere; the species in USFWS's proposal are found in New Zealand, Southern Africa, and South America. Any U.S. protections would therefore focus on regulations and import restrictions (e.g., bringing penguins into US zoos or marine parks would become more difficult). The comment period closed in February, and USFWS may make a final decision during 2009.

## CONSERVATION REPORT

USFWS proposed endangered status for only one species, the African or Jackass Penguin (*Spheniscus demersus*), found near Cape Town and on islands along the southwest coast of Africa. Threatened status was proposed for six other species or population segments: Yellow-eyed Penguins (*Megadyptes antipodes*), White-flipped Penguins (*Eudyptula minor albosignata*, a subspecies of Little Penguins), Fiordland Crested Penguins (*Eudyptes pachyrhynchus*), Humboldt Penguins (*Spheniscus humboldti*), Erect-crested Penguins (*Eudyptes sclateri*), and a population of the Southern Rockhopper Penguin (*Eudyptes chrysocome*) (the Campbell Plateau portion of the New Zealand/Australia Distinct Population Segment).

In its original petition to USFWS for listing of ten penguin species, CBC contended that industrial fishing and climate change have led to their decline across the Southern Hemisphere. USFWS denied protection for the three most ice-dependent penguin species—Northern Rockhopper Penguin (*Eudyptes moseleyi*), Macaroni Penguin (*Eudyptes chrysolophus*), and Emperor Penguin (*Aptenodytes forsteri*). The agency also denied listing for the Southern Rockhopper Penguins in the remainder of their range, concluding that global warming impacts are too “uncertain” to warrant listing those species.

All the penguin species face various threats to their habitat and food sources. For instance, commercial fishing and oyster dredging have contributed to the decline of the Yellow-eyed Penguin, according to USFWS. Fishing operations incidentally catch the penguins, and oyster dredging has modified the local marine habitat on which it depends for food.

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### OAHU PREDATOR PROJECT MOVES FORWARD

PSG wrote the Hawaii Department of Land and Natural Resources in Janu-

ary 2008 to support a proposal to erect a predator enclosure fence at Kaena Point, Oahu (*Pacific Seabirds* 34:52-53, 2007). The proposed fence would be designed to eliminate the harm that dogs, cats, mongooses (*Herpestes auropunctatus*), and rats (*Rattus* spp.) cause to seabird colonies at the Kaena Point Natural Area Reserve on the north point of Oahu. At least 100 seabirds are killed at this reserve each year, and this mortality is a major obstacle to maintaining healthy Wedge-tailed Shearwater and Laysan Albatross colonies. PSG noted that if predators are removed and native vegetation restored, colonies of Red-footed Boobies or Great Frigatebirds (*Fregata minor*) might become established. The fence is now in the final permitting stages and may be erected by late summer or autumn 2009. This schedule would protect breeding albatrosses and shearwaters during the 2009-2010 breeding season. The project was delayed when four petitions opposed the Environmental Assessment. The final alignment was selected with the advice of traditional Hawaiian kupuna, addressing their concerns that the project would allow Hawaiian spirits to be able to leap off the hill top into the afterlife.

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### PSG ASSISTS ERADICATING PACIFIC RATS FROM FIJIAN ISLAND

PSG's Small Grant program supported a project intended to eradicate Pacific rats (*Rattus exulans*) from Mabualau Island, Fiji. The project was completed in 2008, and monitoring will be conducted for the next two years to determine whether the eradication was successful. The Fiji project will protect Red-footed Boobies, Black Noddies (*Anous tenuirostris*), and Lesser Frigatebirds (*Fregata ariel*).

### PSG COMMENTS ON PROPOSED MARINE RESERVES/MARINE PROTECTED AREAS OFF OREGON COAST

In November, thanks to Jan Hoder, PSG asked Oregon's Ocean Policy Advisory Council to consider the needs of marine birds as they undertake marine conservation planning and evaluation in Oregon's Territorial Sea. PSG noted that over one million birds nest on the offshore rocks along the Oregon coast, and that seabirds are top predators that require healthy stocks of forage fish and invertebrates for continued success. Specifically, PSG asked the council to consider designating marine reserves in three areas of the ocean that have been recognized by the Important Bird Area program to be critically important to marine seabirds: Astoria Canyon, Heceta/Stonewall/Perpetua Banks, and Cape Blanco/Port Orford Reef. PSG also endorsed designating the following areas as Marine Reserves/Marine Protected Areas because of their ecological importance to seabirds: Tillamook Head to Cape Falcon; Three Arch Rocks area; Cascade Head; Cape Perpetua to Heceta Head; Siltcoos area; Seven Devils/Cape Arago area; Port Orford Reef area; and Cape Sebastian/Mack Reef area. Oregon's Ocean Policy Advisory Council seems to be considering PSG's comments seriously.

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### FISHING GROUP AGREES TO SAVE BIRDS BY SCARING THEM OFF

The Fishing Vessels Owners' Association, a West Coast longline fishing group, announced in February 2009 that it will alter its equipment to prevent seabird bycatch. Birds such as albatrosses are attracted to the long lines of baited hooks that trail behind the deep-sea fishing vessels; the birds try to eat the bait,



## CONSERVATION REPORT

and they can become hooked and pulled under by the sinking lines. The Alaska longlining fleet has reduced bird deaths by up to 80% by using lines of flapping streamers parallel to the fishing gear that scare the birds away. Some of the techniques that work in Alaska will be put in place by the smaller longlining fleet off the coast of California, Oregon and Washington. This is anticipated to protect Black-footed, Laysan, and Short-tailed (*Phoebastria albatrus*) Albatrosses, as well as other seabird species. The action was taken even though there are few data on the incidence of bycatch in this fishery.

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### FAO ISSUES NEW GUIDELINES TO REDUCE SEABIRD BYCATCH

The United Nations Food and Agriculture Organization (FAO) agreed in March 2009 to a new suite of best-practice guidelines for reducing the accidental deaths of seabirds in fisheries. The new guidelines extend the scope of the FAO's seabird action plan beyond longline fisheries. Previously, FAO's seabird action plan addressed only longline fisheries for tuna (*Thunnus* spp.), swordfish (*Xiphias gladius*), toothfish (*Dissostichus* spp.), and similar high-value fishes. Now the agency will also specify what each nation should do to reduce seabird bycatch in trawls and gillnets. The scope of the guidelines has also been extended, from

fishing nations to the Regional Fisheries Management Organizations that govern high-seas fisheries. New standards are set for research and data collection, observer programs, and education.

The new guidelines have special relevance for the European Union, which is committed to producing a Community Plan of Action for reducing seabird bycatch in domestic waters and wherever European Union-flagged vessels operate overseas. The Community Plan of Action is to be completed in 2009. This will be the first FAO seabird action plan to address all the different kinds of fishing gear that have adverse impacts on seabirds.

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### WIND AND WAVE ENERGY PLATFORMS PROPOSED IN HAWAII

A \$4 billion renewable energy project in the ocean between Oahu and Molokai was proposed in March 2009 by Grays Harbor Ocean Energy Company. The company proposes to erect as many as 100 offshore platforms over a 200 km<sup>2</sup> area, to harness up to 1100 megawatts of electricity from waves and wind. The project could replace most of Oahu's current energy needs. The proposed site is Penguin Bank, the eroded summit of a submerged volcano, which is located in the Hawaiian Islands Humpback Whale National Marine Sanctuary. Penguin Bank was proposed because it is large,

relatively shallow (no more than 55 m deep), close to shore, and near the electricity market of Honolulu. All platforms, which would rival some of Honolulu's tallest buildings, will be at least 16 km from shore, to allay concerns about visual blight. The structures would be a mile apart and would be visible from shore only a few days each year when the sky is exceptionally clear. Impacts to seabirds are largely unknown.

The project would entail the erection of concrete-encased steel pipes extending to the ocean floor. These would support platforms that rising 50 feet above the ocean surface to hold wave and wind turbines. The company has applied for a preliminary permit for the wave portion of the project from the Federal Energy Regulatory Commission (FERC); a decision is expected soon. If the permit is granted, the company could do feasibility studies for three years. Construction would be allowed only if the company subsequently obtained a license from FERC to erect a small-scale pilot project. If that were successful, the company would pursue a commercial license to develop the entire wave project. Grays Harbor is separately pursuing an agreement with the U.S. Minerals Management Service for the wind portion of the project. The windmills would produce 90 percent of the project's electricity; each would consist of three spinning blades over 200 feet long, mounted on a steel tower 300 feet high. Many economic and technical hurdles remain, and the project could be completed around 2016 at the earliest.

# SEABIRD NEWS

## VOLCANO BURIES ALASKA SEABIRD COLONY AND MONITORING SITE

"This was an exceptional year at Kasatochi," begins the Regional Report for that island—a major understatement. Kasatochi volcano erupted violently on 7 August 2008, burying the entire island under more than 10 meters of ash. Two biologists on the island were rescued only 40 minutes before the cataclysm.

Field crews from Alaska Maritime National Wildlife Refuge (AMNWR) have spent the last 13 summers on Kasatochi, a major seabird monitoring site in the central Aleutian chain. The island was a volcanic cone 314 m high and 260 ha in extent, with lush vegetation and a deep-blue lake in its crater. Slopes of grass and forbs, talus, and rock provided habitat for more than 200,000 auklets, murrelets, puffins, storm-petrels, cormorants, gulls, and guillemots. Biologists stayed in a renovated 1920s-era cabin that was originally built by a fox trapper. They compiled data on population trends, survival, productivity, chick growth, and diets. They also monitored songbirds, avian predators (including diets), and



The new Kasatochi Island, Sep 2009. (Photo C. Waythomas, Alaska Volcano Observatory)

marine mammals, documented nearshore oceanography, and inventoried flora and arthropods. Their seabird monitoring included neighboring Ulak and Koniugi Islands, but Kasatochi was the "mother lode" for auklet studies in the central Aleutians. There had been no volcanic activity in historic times, other than one uncertain report in 1760, and a little bubbling in the lake that biologists observed a couple of years ago. The volcano was considered extremely unlikely to erupt.

Ray Buchheit and Chris Ford arrived at Kasatochi on the refuge vessel *Tiglax* in May 2008 and spent a normal field

season there. The *Tiglax* was due to pick them up in late August.

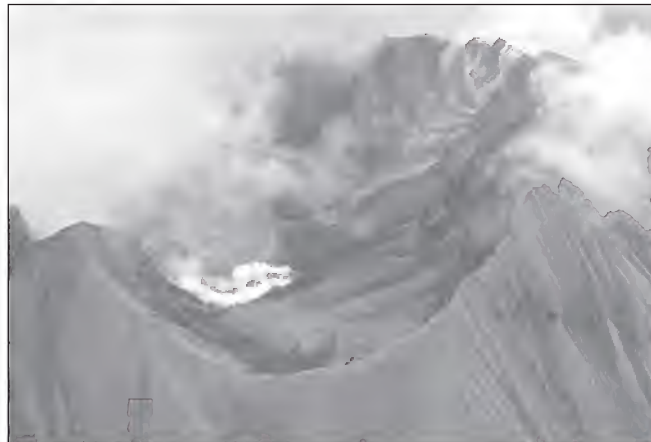
On 2 August the biologists began noticing small earthquakes, which are not unusual in the Aleutians. However, the events increased in frequency and intensity during successive days. The men reported them to the refuge's field office on Adak Island, 50 miles away. Lisa Spitler in the Adak office checked the website of the Alaska Volcano Observatory (AVO) and inquired by telephone. AVO told her that Kasatochi was dormant, but they adjusted their instrumentation to monitor it more closely.

The earthquakes on Kasatochi increased and the biologists' concerns grew. By 6 August, two to three tremors were coming every 5 minutes. AVO recommended to the refuge that Buchheit and Ford should be evacuated.

Lisa Spitler in the Adak office started arranging the rescue. The *Tiglax* was 24 hours away. A U.S. Coast Guard helicopter happened to be at Adak—but it was under repair. Spitler finally contacted



Kasatochi crater on 6 Aug 2008, the afternoon before the eruption. Tremors are causing rockfalls from cliff into lake (opposite side, just right of center).



Kasatochi crater after the eruption, 23 Aug 2008. Note fumaroles (very white gas plumes, front center). Stream flowing down into caldera (on right) is already refilling lake.

## SEABIRD NEWS

a local fisherman, Al Giddings. He and deckhand Eric Mochinzuk agreed to leave for Kasatochi at dawn in his 32-foot vessel.

By 7 August, Kasatochi was emitting a new sulfurous smell. In mid-morning came a strong nine-minute earthquake. Buchheit and Ford headed for the beach. They considered leaving for Great Sitkin Island in their rubber boat; however, the weather and seas were bad for a 30-km crossing, and Giddings would not be able to find them. AVO informed the refuge at 10:30 that the seismic tremors were changing to a type that indicates an imminent eruption. Giddings was less than 10 miles away by this time, and he reassured everyone over the radio that he would arrive soon.

The *Homeward Bound* reached Kasatochi about noon. Ford and Buchheit hurried aboard with just one small bag each. Most of their gear, including com-

puters and personal belongings, was left behind. Approximately 40 minutes after the boat left, Kasatochi erupted with an explosion of super-hot gas and volcanic ash. Violent eruptions continued into the next day, blowing away part of the crater rim and scorching the island with pyroclastic flows. Ash plumes rose to 45,000 feet, blew eastward around the globe, and disrupted air traffic between Alaska and the Lower 48.

Refuge staff visited Kasatochi two weeks later. The island was buried under a hot gray mantle. Its contours were transformed, the cabin was under 30 m or of ash, and the new shoreline was several hundred meters beyond the old one. A few Steller's sea lions, Glaucous-winged Gulls, and Tufted Puffins (and one Peregrine Falcon) had returned; no other birds were seen. Nests with fledgling puffins, storm-petrels, and some auklet chicks were deep under the ash.

Alaska Maritime National Wildlife Refuge lost a seabird-monitoring site that will be difficult to replace. Many data for 2008 were lost along with the computers, but about half the data could be reconstructed from notebooks that were saved. The refuge is taking a positive view—biologist Jeff Williams wrote, "It is a great opportunity to look at re-establishment of an island. Seldom does there exist 'before' data, but in this instance we have it." They are already planning to monitor the island's slow recolonization. But the most important outcome is that, owing to the courage of Al Giddings and Eric Mochinzuk and Lisa Spitler's coordination, the two refuge biologists are safe.

(Sources: Jeff Williams, U.S. Fish and Wildlife Service, Alaska Maritime National Wildlife Refuge, Homer, Alaska; Alaska Volcano Observatory, University of Alaska, Fairbanks [<http://www.avo.alaska.edu>].)



Kasatochi Island, 2006. Refuge cabin (former fox trapper's cabin) is small white object at top of low cliff, near left side of photo.



Kasatochi Island after eruption, from same viewpoint as photo at left. Site of cabin is indicated. Note how shoreline now extends farther to left and towards viewer. (Last 4 photos U.S. Fish & Wildlife Service)



# PSG NEWS

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## **ALL FUTURE ISSUES OF *PACIFIC SEABIRDS* WILL BE MOSTLY ELECTRONIC**

Starting with the next issue of *Pacific Seabirds* (Volume 36, publication year 2009), **this journal will be mailed only to those members who specifically request it.** Members who do not request a hard copy of *Pacific Seabirds* via mail will be able to download every issue from the PSG website, [www.pacificseabirds.org](http://www.pacificseabirds.org). The paper and electronic versions of the journal will still look the same.

*You are welcome to continue receiving Pacific Seabirds in the mail as long as you wish. However, any member who wants to continue receiving copies by mail after this issue must contact the Treasurer, Ron LeValley. His e-mail is [membership@pacificseabirdgroup.org](mailto:membership@pacificseabirdgroup.org) or [ron@madriverbio.com](mailto:ron@madriverbio.com); address P.O. Box 324, Little River, CA 95456-0519, USA; telephone (707) 496-3326 (cell) or (707) 937-1724 (work).*

Libraries and institutions will automatically continue to receive *Pacific Seabirds* through the mail, since this can be important for reliable archiving.

The PSG Executive Council has decided in favor of distributing *Pacific Seabirds* electronically to most members because many journals already are electronic (including our other journal, *Marine Ornithology*), and because the change will save printing and mailing costs. Some people prefer to receive their journals online. However, we will continue to send *Pacific Seabirds* through the mail on request, because some members cannot get it over the Internet conveniently, or they may just prefer a paper copy.

For any questions, please contact the Treasurer (information above) or the Editor, Vivian Mendenhall ([fsgadair@attalascom.net](mailto:fsgadair@attalascom.net)).

Thank you for your support of PSG and *Pacific Seabirds*!

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## **PSG MEETINGS IN 2010 THROUGH 2012**

PSG will hold its annual meeting for 2010 in Long Beach, California, on 17-21 February.

The next PSG meeting after Long Beach will take place at the World Seabird Conference on 7-11 September 2010, in Victoria, British Columbia, Canada. PSG is host for this major conference, in which more than twenty other seabird groups worldwide are participating formally. Symposia are planned on restoration of seabird islands, impacts of global climate change on seabirds, seabird-fishery interactions, and seasonal seabird movements; special paper sessions may include variability in seabird populations and life-history parameters, disease, pollution, and the relationship between fishery management and seabird conservation.

There will be no meeting in 2011 (because two meetings will have been held in 2010; this has happened occasionally in the past when PSG participated in a special conference).

PSG's regular meeting schedule will resume in early 2012, with an annual meeting on Oahu, Hawai'i. The date and other details are being determined.

# REGIONAL REPORTS

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Regional reports summarize current seabird work of interest to PSG members. Regional Reports generally are organized by location of the work, not by affiliation of the biologist. They should not be cited without permission of the authors. Several longer reports will appear in the next issue.

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## ALASKA

Compiled by **Heather Renner**

### SOUTHEAST ALASKA

**Michelle Kissling** (U.S. Fish and Wildlife Service [USFWS]), **Scott Gende** (National Park Service), and many other collaborators completed another field season studying Kittlitz's Murrelets (*Brachyramphus brevirostris*) in Icy Bay, Alaska. As in 2007, they attached radio transmitters to 32 birds in May and located birds throughout the breeding season. In 2008 they also determined mercury levels for all radio-tagged birds, banded an additional 52 individuals, and attached radios to 3 hatch-year birds. In hopes of gathering information about post-breeding movements of this species, they radio-tagged an additional 10 individuals in late July and August. **Nick Hatch**, who has worked on this project for two years, began a Master's project titled, "Diet composition and reproductive energetics of a rare and declining seabird, the Kittlitz's Murrelet" at Oregon State University under direction of **Dan Roby**. The Kittlitz's Murrelet work in Icy Bay is expected to continue through 2011.

Population trend and annual productivity data were collected at St. Lazaria Island on eight species of seabirds breeding there: Fork-tailed Storm-Petrel (*Oceanodroma furcata*), Leach's Storm-petrel (*O. leucorhoa*), Pelagic Cormorant (*Phalacrocorax pelagicus*), Glaucous-winged Gull (*Larus glaucescens*), Common Murre (*Uria aalge*), Thick-billed Murre (*U. lomvia*), Rhinoceros Auklet (*Cerorhinca monocerata*), and Tufted Puffin (*Fratercula cirrhata*). For Pigeon Guillemots (*Cephus columba*), only population data were collected. Diet

samples were also collected for both species of Storm-Petrels, Pelagic Cormorants and Rhinoceros Auklets. The field crew consisted of **Emily Tompkins** (for a second season), **Margaret Bellows**, **Tracie Merrill**, and **Leslie Slater**.

**Kim Nelson** (Oregon State University [OSU]), **Scott Newman** (Food and Agricultural Organization of the United Nations), **Darrell Whitworth** (California Institute of Environmental Studies), **Harry Carter** (Carter Biological Consulting), and **Matt Kirchhoff** (Alaska Department of Fish and Game [ADFG]) continued their study on the health, activity patterns, foraging ranges, and habitat use of Marbled Murrelets (*Brachyramphus marmoratus*) in the Port Snettisham area of Southeast Alaska. Our focus this year was on breeding behavior, identifying nesting habitat, documenting movements of nesting birds, and studying foraging and forage flock behavior. We again radio-marked 40 adult murrelets and tracked them using aerial flights, boat surveys, and data loggers. We located 16 tree and ground nests (for a total of 36 nests over 4 years). We continued to look at the temporal and spatial distribution of murrelets on the water in relation to forage fish schools, tides, time of day, and other factors. We found that distance to flyways was one of the most important variables affecting murrelet distribution relative to prey, and that murrelets tracked prey over a broader range of scales at medium relative abundances compared with low and high abundance. Mixed-species forage flocks included up to 13 bird species and Humpback Whales (*Megaptera novaeangliae*). As was the case last year, capelin (*Malotus villosus*) was the only forage fish species found below the feeding flocks

(dip-net samples). We recorded three observations of humpback whales rising to the surface to capture a capelin ball and in the process accidentally consuming murrelets and other seabird species. On one occasion, 10 or more birds may have been consumed by the whale. Field support was provided by **Blake Barba-ree**, **Trevor Haynes**, **Veronica Padula**, **Spencer Plumb**, and **Sarah Thomsen**, with assistance during captures from **Sean McAllister**, **Percy Hebert**, **Shane Moore**, and **Mike Mauntler**. This project is funded by ADFG, Division of Wildlife Conservation.

A survey of seabirds between Washington and Alaska, conducted by **Shannon Fitzgerald** of the National Oceanographic and Atmospheric Administration, included the Inside Passage south of Juneau (see Washington-Oregon regional report).

### GULF OF ALASKA

At East Amatuli Island in the Barrens group, **Arthur Kettle**, **Kathryn Frens**, **Em McKeever**, and **Gina Peters** (USFWS, Alaska Maritime National Wildlife Refuge [AMNWR]) monitored reproductive success, prey, and population trends of Fork-tailed Storm-Petrels, Black-legged Kittiwakes (*Rissa tridactyla*), Common and Thick-billed Murres, and Tufted Puffins.

**Leslie Slater** (AMNWR), with help from **Meg Hahr** of Kenai Fjords National Park (KFNP), completed replicate seabird counts in the Chiswell Islands within AMNWR, as well as some Horned Puffin (*Fratercula corniculata*) colonies within KFNP in July 2008.

**Bill Ritchie** of the Washington Department of Fish and Wildlife (WDFW) greatly assisted with Marbled Murrelet

transect counts and seabird colony counts near Afognak and Shuyak islands. This was a cooperative study involving additional participation from **Jeff Lewis** and **Bill Pyle** (Kodiak National Wildlife Refuge), **David Irons** and **Kathy Kuletz** (USFWS, Migratory Bird Management, Anchorage [MBM]), with project oversight by **Leslie Slater**.

Caspian Terns (*Sterna caspiana*) were discovered breeding on a small island on the fish-rich Copper River Delta near Cordova, Alaska in 2005. Joint monitoring in 2008 by the Prince William Sound Science Center (PWSSC), supported by OSU, revealed that the colony is increasing rapidly, with 209 viable nests counted in 2008 compared to 118 in 2006. Small numbers have been noted breeding at various locations in Alaska, although at around 60° north, this is close to the northern edge of their range.

The PWSSC, in conjunction with USFWS, is conducting surveys of seabird distribution in Prince William Sound throughout the non-breeding season. Abundance and habitat use throughout the fall and winter will be examined for the 42 species of seabird and sea duck recorded. This study aims to assess the role of seabird predation in suppressing recruitment to the Pacific herring (*Clupea pallasii*) population, which has not recovered since its collapse soon after the 1989 oil spill. By the same token, the importance of this food source to particular species of wintering seabirds such as the declining Marbled Murrelet may be highlighted. Hydroacoustic surveys and sampling of fish schools are being undertaken concurrently in major over-wintering areas for juvenile herring. A complementary study starting in Fall 2008 aims to capture Marbled Murrelets in Prince William Sound at several points through the non-breeding season to provide data on body condition at this energetically demanding time of year.

**Bob Day** and **Steve Murphy** (ABR, Inc.—Environmental Research & Services [ABR]) continued research on the effects of the *Exxon Valdez* oil spill on birds in Prince William Sound. Bob and **Adrian Gall** (ABR) continued research on sea-

sonal and inter-annual patterns of distribution and abundance of seabirds and marine mammals in lower Cook Inlet.

**Tuula Hollmen** of the Alaska SeaLife Center [ASLC] and University of Alaska Fairbanks [UAF], together with ASLC sea duck research staff **David Safine**, **Shiway Wang** and **Ann Riddle** and graduate students **Abbie Ellsworth**, **Rebekka Federer**, **Mary Bozza** and **Chris Latty** (all of UAF), worked on several research projects involving captive eiders, laboratory, and field studies. Projects focused on reproductive physiology, disease ecology, nutrition, and diving physiology. Theses completed in 2008 include “Responses of captive Common Eiders (*Somateria mollissima*) to implanted satellite transmitters with percutaneous antennas” by **Chris Latty**, and “Characterization of annual sex steroid and behavioral profiles in Spectacled Eiders (*Somateria fischeri*)” by **Abbie Ellsworth**. **Rebekka Federer** has completed her lab analyses and plans to defend her thesis, “Nutrient allocation to reproduction in captive Spectacled Eiders using  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  isotope analyses,” in spring 2009.

**Tuula Hollmen**, **Shiway Wang** and **Sara Iverson** (Dalhousie University) received funding from the North Pacific Research Board (NPRB) to estimate diets of two threatened species, the Steller’s (*Polysticta stelleri*) and Spectacled Eider. They validated quantitative fatty acid signature analysis on captive eiders, providing the basis for characterization of dietary patterns. The project will lead to further understanding of the species’ habitat requirements and how environmental changes in the marine ecosystem may impact their populations.

**Hollmen** and **Ann Riddle** (ASLC) received funding from the *Exxon Valdez* Oil Spill Trustee Council to evaluate injury to Harlequin Ducks (*Histrionicus histrionicus*) from sublethal concentrations of hydrocarbons in Prince William Sound, using species-specific cell lines. Ann is also assessing flock diversity by genotyping the captive flock of Steller’s and Spectacled Eiders at the Alaska SeaLife Center, in collaboration with

the U.S. Geological Survey (USGS) Molecular Ecology Laboratory.

**David Safine** finished collecting data for a study on the dynamics of plasma yolk precursors in laying Spectacled Eiders. This project aims to assess the feasibility of estimating breeding propensity in sea ducks by the use of yolk precursors. Collaborators are Tuula Hollmen, Ann Riddle, **Dan Esler** and **Tony Williams** (both of Simon Fraser University).

**Scott Hatch** (USGS Alaska Science Center) continued research and monitoring on Middleton Island, including continuation of the protocol for supplemental feeding of Black-legged Kittiwakes in the radar-tower colony. Construction continues on a Common Murre research habitat to complement the tower colony of kittiwakes and Pelagic Cormorants. **Jana Kotzerka** (University of Kiel, Germany) served as camp leader on Middleton and continued her studies of seabird foraging behavior, including deployment of time-depth recorders on cormorants and miniature GPS trackers on kittiwakes. **Sarah Leclaire** (University of Toulouse, France) completed her second year of studies on mate choice in kittiwakes. Middleton volunteers included **Jens Eichstädt** and **Britta Merkel** (Germany), **Brigitte Planade** and **Emilie Moëc** (France), **Carolina Bello** (Spain), **Kevin Kelly** (Canada), and **Casey Eganey** (California). In 2008, kittiwakes on Middleton had their most productive season in many years, hinting at possible changes in oceanography and prey populations in the Gulf of Alaska. In the office, Scott completed and launched web applications for data entry and data retrieval from the Pacific Seabird Monitoring Database (accessible online at <http://seabirds.usgs.gov>).

**William Ritchie** (WDFW) worked with the USFWS on seabird and marine mammal surveys around Afognak and surrounding islands, in the Gulf of Alaska northwest of Kodiak. The primary objective of this research study was to conduct seabird colony surveys and marine bird and mammal transects to detect changes in abundance and distribution of all



species, with an emphasis on Marbled Murrelet. The surveys were a joint effort between **Bill Pyle**, **Brandon Saito**, and **Jeff Lewis** at the Kodiak National Wildlife Refuge, **Leslie Slater** (AMNWR), and **David Irons** and **Kathy Kuletz** (MBM). Surveys were conducted from a skiff supported by the USFWS research vessel *Ursa Major II*. Preliminary data suggest lower numbers for most species, and fewer colonies, than were previously reported.

#### ALEUTIAN ISLANDS — SEABIRD MONITORING

**Jeff Williams** coordinated long-term seabird monitoring for AMNWR at Aiktak, Kasatochi, and Buldir Islands and other studies in the archipelago. At Aiktak Island in the eastern Aleutians, **Brie Drummond** and **Maureen McClintock** monitored timing of nesting events, reproductive success, food habits, and population size of Glaucous-winged Gulls, Black Oystercatchers (*Haematopus palliatus*), Tufted Puffins, Ancient Murrelets (*Synthliboramphus antiquus*), and Leach's and Fork-tailed Storm-Petrels.

In the central Aleutians, there have been 3 annual monitoring sites: Kasatochi, Ulak, and Koniui Islands. At Ulak Island, populations and productivity of burrow-nesting seabirds were monitored, and cormorant and murre population levels were recorded. On nearby Kasatochi, **Ray Buchheit** and **Chris Ford** primarily studied Least and Crested Auklet (*Aethia pusilla* and *A. cristatella*) productivity, chick growth, food habits, attendance patterns, populations and adult survival rates. They also monitored population levels of Pigeon Guillemots, Red-faced (*Phalacrocorax urile*) and Pelagic Cormorants, and Leach's and Fork-tailed Storm-Petrels. This was an exceptional year at Kasatochi—the island's volcano erupted on 6 August; it buried all seabird colonies and the year's data, and the researchers barely escaped with their lives! [See article under "Seabird News"—Editor.]

At Buldir Island in the western Aleutians, **Scott Freeman**, **Kevin Payne**, and **Bob Keller** conducted the

21st year of annual seabird monitoring. Species monitored included Red-legged (*Rissa brevirostris*) and Black-legged Kittiwakes, Common and Thick-billed Murres, Least, Crested, Whiskered (*Aethia pygmaea*) and Parakeet (*A. psittacula*) Auklets, Pelagic and Red-faced Cormorants, and Leach's and Fork-tailed Storm-Petrels. For most species, timing of nesting events, productivity, food habits and population levels were monitored.

#### ALEUTIAN ISLANDS — OTHER RESEARCH

**Steve Ebbert** (AMNWR) led a project to trap foxes on islands in the Sanak Group, a cooperative partnership with the Sanak Corporation, to restore native seabird populations. This was a follow-up to the main trapping initiated in 2007.

**Jeff Williams** and **Margaret Petersen** (USGS) captured Common Eiders on Adak and Amchitka Islands and implanted satellite transmitters to determine movement patterns of Aleutian eider populations. Results so far have indicated that eiders remain very close to their breeding location year round.

Conservation groups and the AMNWR are calling the extermination of Rat Island's namesake rodent population a success, although it will take several years to determine whether the island is truly rat-free. Organizers anticipated spending up to 45 days on the island but wrapped up the project up in just 10 (26 Sep to 5 Oct), due to an unexpected spell of favorable weather. AMNWR worked with the Nature Conservancy and Island Conservation to coordinate the eradication. Rats arrived on the island after a shipwreck in the 1780s and have since overrun the native ecosystem, taking a heavy toll on seabird populations. The refuge hopes that once the rats are gone, seabirds will return to the island. Rats have been eradicated on 250 islands worldwide, but Rat Island is unique for its remoteness and extreme weather conditions. At 2777 ha, it is also the third-largest island where eradication has been attempted. Eighty thousand kg of equipment, including 50,000 kg of rat

bait and 18,527 l of helicopter fuel, were ferried ashore from vessels, while two helicopters from Pathfinder Aviation in Homer "hopscoched" to Rat Island. The poison (brodifacoum) was administered in 45,359 kg of bait pellets, which were hand-loaded into broadcast buckets and were spread over the island by helicopter. Pellets were spread by hand around ponds and sensitive areas.

**Jeff Williams** conducted a survey of Ayugadak Islet to document seabird species prior to eradication of rats (*Rattus norvegicus*) on nearby Rat Island. It is thought that Ayugadak can act as a reservoir for breeding seabirds to repopulate Rat Island, which is only 1000 m away. Ayugadak does not have rats and is home to hundreds of nesting Whiskered and Cassin's Auklets (*Ptychoramphus aleuticus*), Tufted Puffins, and Leach's Storm-Petrels.

**Alex Bond**, PhD candidate at Memorial University of Newfoundland (MUN) has been working in the past year on Kiska Island on the diet and demography of Least Auklets and the species' relationship with rats. Bond is collaborating with Jeff Williams and **Vernon Byrd** (AMNWR) and **Ian Jones** (MUN). Norway rats were significantly more abundant than in 2007; nevertheless, Least Auklet productivity was 0.64, the highest recorded from Kiska since monitoring began in 2001. After the eruption of Kasatochi, which was home to hundreds of thousands of auklets, Bond mused that the 2009 season may be "a very interesting one."

**Ian Jones**, **Rachael Buxton** and **Heather Major** conducted work on Amatignak and Little Sitkin Islands. The goal was to document the presence of nesting seabirds on islands where Arctic foxes (*Alopex lagopus*) have been introduced. The team established that some Ancient Murrelets and Storm-Petrels are breeding in low numbers on each island. They also conducted social attraction experiments to document the response of these species to call playback. Results were very encouraging and suggest that these species respond favorably to social facilitation actions. It is hoped that a

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protocol to help recovery on these islands can be developed to aid managers and biologists in restoring these systems.

AMNWR assisted several researchers conducting work at Bogoslof Island in preparation for a 2 year project of the Bering Sea Integrated Ecosystem Research Program (BSIERP). AMNWR also continued its Seabird and Marine Mammal and Oceanography Coordinated Investigations (SSMOCI) at Buldir Island in 2008. The crew included **Jeff Williams, Martin Renner, Deb Rudis, Catherine Berg, Ian Jones, John Piatt, Erica Madison, Brenda Holladay and Mary Price.**

### BERING SEA

In the Pribilof Islands, AMNWR's annual monitoring program of kittiwakes, murres and auklets was conducted by **Greg Thomson and Luke DeCicco** on St. Paul Island, and **Paula Shannon, Claudia Mischler and Nikolai Konyukhov** on St. George Island. In addition, population counts were conducted of ledge-nesting species in July by **Dennis Wynn** on St. Paul and by **Kathy and Roger Herrnsteen** on St. George.

The first year of the BSIERP was initiated in 2008, with funds from the NPRB. Seabird projects included intensive colony work on the Pribilof Islands by AMNWR (**Caroline Poli and John Warzybok**), OSU (**Rosana Paredes**), and students of **Sasha Kitaysky** (University of Alaska Fairbanks [UAF]). **Kathy Kuletz** (USFWS) coordinated seabird surveys at sea for the project. Numerous volunteers and seasonal employees assisted.

**Diane Calamar Okonek and Brian Okonek** (ADFG) monitored Black-Legged Kittiwake, Common Murre, and Pelagic Cormorant populations and productivity on Round Island, in the Walrus Islands State Game Sanctuary.

**Kathy Kuletz** relinquished her seat on the North Pacific Fishery Management Council's Bering Sea and Gulf of Alaska Plan Teams; she was replaced by **Leslie Slater**.

### NORTHERN ALASKA

Annual seabird monitoring was conducted at Cape Lisburne, where **Dave Roseneau and Jim Schneeweis** (AMNWR) collected data on the population and reproductive success of Black-legged Kittiwakes and Common and Thick-billed Murres.

The Alaska Cooperative Fish and Wildlife Research Unit continues its research on the migration of King Eiders (*Somateria spectabilis*) from north Alaska into the Bering Sea. In August 2008, we captured 13 adult female and juvenile King Eiders 20 km southeast of Teshekpuk Lake on Alaska's North Slope and implanted them with satellite transmitters. Transmitters provide locations every 5 days; you can track them via GoogleEarth at <http://mercury.bio.uaf.edu/kingeider>. For more information contact **Steffen Oppel** ([steffen.oppel@gmail.com](mailto:steffen.oppel@gmail.com)). Oppel cooperated with the North Slope Borough's Department of Wildlife Management on the 7th season of King Eider nest monitoring and trapping, at a study site 10 km south of Teshekpuk Lake. During June and July they quantified the amount of time King Eiders spend foraging after arrival on breeding grounds. They also monitored nesting success; 2008 turned out to be an extremely poor year, possibly due to very warm and dry weather.

**Bob Day and Adrian Gall** (ABR) began a study of seasonal and interannual patterns of distribution and abundance of seabirds in the Chukchi Sea.

### RUSSIA

**Falk Huettmann** and his Ecological Wildlife Habitat Data Analysis for the Land and Seascape (EWHALE) laboratory at UAF surveyed Long-billed Murrelets (*Brachyramphus perdix*) in Russian waters off Sakhalin Island. Line transect surveys were done in June and August off the Verengery River region. This was the third year of such surveys, which have been done consistently. Noteworthy was the quantification of chicks on the water and their temporal occurrence. In addition, strong efforts were invested in creating a seabird-re-

lated Arctic GIS database, and in running a Marxan analysis for designing a circumpolar arctic national park.

### OTHER PROJECTS

**Huettmann** contributed several chapters for the "Good Professional Practice" handbook for Marxan runs (<http://www.pacmara.org/>) that help establish Marine Protected Areas (MPAs). A PhD project with **Sue Hazlett** is currently assessing the effectiveness and costs associated with MPAs, using Marxan and ALCES (A Landscape Cumulative Effects Simulator) algorithms in Glacier Bay.

In collaboration with **C. Deal and D. Atkinson** of the International Arctic Research Center (IARC), another new project at the EWHALE lab involved MSc candidate **Grant Humphries's** modeling of dimethyl sulfide (DMS) as a seabird habitat feature in the North Pacific. Monthly global maps have been created for DMS, and the link between DMS and seabirds is being further investigated. Quantitative and spatially-explicit predictions are being sought.

**Dave Roseneau** (AMNWR) coordinated collection of murre and gull eggs for the long-term Seabird Tissue Archival and Monitoring Project (STAMP) contaminants program. He arranged to get eggs from a number of nesting colonies within AMNWR, as well as elsewhere in Norton Sound, the Bering Strait, and the eastern Chukchi Sea. The NPRB provided funding.

**Bob Day** (ABR), in cooperation with **Michelle Kissling** (USFWS), continued research on Kittlitz's Murrelet plumages at museums. Bob and **Richard Greer** (Golder Associates) finished a synthesis of the effects of light on arctic organisms, including seabirds.

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## CANADA

Compiled by **Ken Morgan**

### BRITISH COLUMBIA

**Pat Baird** (Centre for Wildlife Ecology [CWE] at Simon Fraser University [SFU], Burnaby, British Columbia



[BC]) continued working on Western Sandpipers (*Calidris mauri*). Her team has been involved in a multi-component survey of water birds, especially sandpipers, on the coast of Panama (Darién to Chitre) and the coast of California from Mexico to Monterey. They radio-tagged Western Sandpipers in Panama Bay and followed them to coastal and inland California, parts of coastal Oregon, southwestern coastal British Columbia, and the Copper River Delta, of Alaska. Baird collaborated with **Roy Lowe** (U.S. Fish and Wildlife Service [USFWS]), **Eric Davies** (grad student, University of Toronto [UT]), **Natyi Montenegro** and **Arce Wong** (grad students, University of Panama [UP]), **Ovidio Jamarillo** and **Angel Sosa** (undergrads, UP), and volunteers **Evan Davies** (UT), **Liz Hayes** (Long Beach, California), **Neil Dawson** and **Mary Anne Bishop** (Prince William Sound Science Center), **Sherri Miller** (U.S. Forest Service), **Josh Adams** (U.S. Geological Survey), **Chris Mull** and **Zed Mason** (California State University [CSULB]), **Leah Bendell** (SFU), and **Tim Burr** (U.S. Navy).

**Doug Bertram** of the Canadian Wildlife Service (CWS), Sidney, BC continued working on population trends in Marbled Murrelets (*Brachyramphus marmoratus*), using radar monitoring at key locations in BC. He is chair of the Canadian Marbled Murrelet Recovery Team. Bertram and collaborator **Bernard Schroeder** (Bernard Schroeder Consulting, Nanaimo, BC) surveyed the Central and South Coast Marbled Murrelet Conservation regions of BC. Bertram is also working with grad student **Michael Janssen** and his supervisor **Ryan Norris** (University of Guelph [UG]) and **Peter Arcese** (University of British Columbia [UBC]) on Marbled Murrelet diet, condition, and timing of breeding in Desolation Sound, BC. Bertram loaned a radar unit to **Dave Lindsay** of TimberWest Forest Products (Nanaimo, BC) for an ongoing project on eastern Vancouver Island. TimberWest summer employees **Jaylene Goorts** and **Roxanne Tripp** conducted Marbled Murrelet radar surveys based from a truck. Bertram

loaned another unit to **Heather Major** (PhD candidate, SFU) for her project on Ancient Murrelets (*Synthliboramphus antiquus*) on Langara Island in the Queen Charlotte Islands, BC (QCI; also known as Haida Gwaii). **James Clowater** continued work on a database of marine bird distribution and abundance, including Marbled Murrelet observations at sea, as part of a bycatch study; funding was a grant from the Canadian Interdepartmental Recovery Fund, via Bertram.

**Alan Burger** (University of Victoria [UVIC], Victoria, BC) is continuing research on Marbled Murrelets and other seabirds. In 2008-09 he is surveying habitat plots along the north and central coasts of BC and on eastern Vancouver Island, in collaboration with **David (Dov) Lank** and **Michael Silvergieter** (SFU) and field assistants **Michelle Paleczny** and **Natalie Arseneau** (UVIC). This work will complement the growing database (now over 26,000 trees) showing the availability of potential nest platforms for murrelets in all coastal regions of the province. Preliminary analysis shows significant regional trends in moss development and platform availability, in addition to the expected effects from tree species and size. Burger is also continuing work with **Louise Waterhouse** (BC Ministry of Forests, Nanaimo, BC), **Alvin Cober** (BC Ministry of Environment [BCMOE], Haida Gwaii), and Lank on analyzing data from low-level helicopter surveys to identify and map murrelet nesting habitat in BC.

**Trudy Chatwin** of BCMOE, Nanaimo, BC, continues to be involved with the conservation of old-growth habitat on Vancouver Island. She is working with the Marbled Murrelet Habitat Recovery Implementation Group to set aside Wildlife Habitat Areas (WHA) for murrelets. She is also working with **Monica Mather** (BCMOE, Nanaimo, BC) on a Conservation Assessment Mapping project to determine how much suitable habitat is protected within parks, WHAs and Old Growth Management Areas.

Chatwin is now analyzing data she collected during the 2006 and 2007 breeding seasons on disturbance distances of

seabirds at colonies and at roost sites on Vancouver Island. She is determining the factors that influence the distance at which birds responded (became noticeably agitated or flushed). Factors include bird species, their acclimatization to boat traffic (motorized or kayak), whether nesting or roosting, time of year, and sea conditions. Boat tests were conducted in Barkley Sound, Clayoquot Sound and in the Southern Strait of Georgia, with the help of the Conservation Officer Service and rangers from BC Parks and the Parks Canada Agency (PCA). Chatwin hopes to develop scientifically-based viewing guidelines that will allow boaters to appreciate seabirds without adversely impacting the birds.

Chatwin is also conducting nest counts of Double-crested (*Phalacrocorax auritus*), Brandt's (*P. penicillatus*) and Pelagic (*P. pelagicus*) Cormorants around Vancouver Island, working with **Harry Carter** (Carter Biological Consulting, Victoria, BC), Parks Canada and CWS to. They conducted opportunistic surveys in Barkley Sound, southwest Vancouver Island, the Strait of Georgia, and Clayoquot Sound. The results indicate drastic declines, and many historic nest sites were unoccupied.

They hope to gather data in 2009 from Nootka through Kyuquot Sound on the west coast of Vancouver Island, and to acquire count records for Triangle Island. Possible causes of the declines are high levels of predation by Bald Eagles (*Haliaeetus leucocephalus*) or changes in forage-fish availability. Chatwin also worked on assessing the risk to birds from the August 2007 oil spill from a barge in Robson Bight Ecological Reserve, on the east coast of Vancouver Island.

**Louise Blight** is continuing her PhD at UBC. She is studying how Glaucous-winged Gulls (*Larus glaucescens*) can serve as monitors of coastal ecosystem change in southwestern BC over the past century, working with **Peter Arcese** at UBC's Centre for Applied Conservation Biology. She has also been Co-Chair of the Local Organising Committee for the World Seabird Conference, to be held in Victoria, BC in Sept 2010.



**Anne Harfenist** (Harfenist Environmental Consulting) continued to study survival of Leach's Storm-Petrel (*Oceanodroma leucorhoa*) at two sites along the BC coast. Her assistants were contractors **Janet Gray** (Queen Charlotte City, BC) and **Adrian Dorst** (Tofino, BC). This is the third year of the project, funded through the Bulkley Valley Centre for Natural Resources Research and Management. Adult survival estimates will be generated for two colonies: Rock Islet (southeast QCI) and Cleland Island (off southwestern Vancouver Island).

**Mark Hipfner** (CWE, Burnaby, BC and CWS, Delta, BC) reported that 2008 marked the 15th year of the CWE's seabird research and monitoring program on Triangle Island, BC. The 2008 field crew consisted of Hipfner, **Mikaela Davis**, **Vanessa Richard**, **Ummat Somjee**, and **Johanna Havelaar** (SFU contractors), **Josh Malt** (BCMOE), **Kyle Morrison** (MSc student, SFU), **Mieke van Opheusden** (SFU volunteer), **Connie Smith** (CWE), and **Marjorie Sorenson** (MSc student, UG). They monitored breeding chronology, breeding success, and related demographic parameters in Cassin's Auklets (*Ptychoramphus aleuticus*), Rhinoceros Auklets (*Cerorhinca monocerata*), Tufted Puffins (*Fratercula cirrhata*), Common Murres (*Uria aalge*), Pelagic Cormorants, Black Oystercatchers (*Haematopus bachmani*), and Glaucous-winged Gulls. Breeding success in 2008 was excellent for most species; of particular note, it was the most successful year in the 15-year time series for Rhinoceros Auklets and Tufted Puffins. On the other hand, Common Murres failed to raise any young at all in 2008, while very few Pelagic Cormorants even laid eggs. This was apparently due to excessive disturbance by eagles. The CWS also continued with their seabird-monitoring program in BC in 2008. Hipfner also assisted CWE's work on Coats Island, Nunavut (NU; see "Arctic Canada," below).

**Moir Lemon** (CWS, Delta, BC) led contractors **Glen Keddie** and **Rachel Darvill** in population surveys at the Ancient Murrelet and Cassin's Auklet colo-

nies on East Copper and George islands (QCI). Hipfner and Keddie visited Pine and Lucy Islands (Queen Charlotte Strait area, BC) in June and July to carry out surveys and band breeding Rhinoceros Auklets; this was part of a pilot project to investigate the effects of fisheries by-catch on these large populations. **Akiko Shoji** (MSc candidate, University of Ottawa) studied incubation behavior in Ancient Murrelets at Reef Island, Haida Gwaii in Apr-Jun 2008, using birds that occupied nest boxes that were installed in 1997. Of 74 surviving boxes, 82% were occupied in 2008. The team also monitored breeding chronology and success. Adult birds were collected for stomach contents analysis, and adult blood was collected for stable isotope analysis and sexing. Assistants were **Jake Pattison** and **Kerry Woo** (contractors, CWS) and **Motomi Yoneda** (volunteer); **Tony Gaston** (CWS, Ottawa, ON) provided guidance. **Kyle Elliott** (MSc student, University of Manitoba [UM]) studied the foraging behavior of two plankton-feeding alcids that nest on Reef Island, Ancient Murrelets and Cassin's Auklets. Elliott also studied the species' diving behavior and collected birds for examination of their physiological adaptations. Conditions for Ancient Murrelet reproduction at Reef Island in 2008 seemed different from 2007 and the 1980s; the mean time between first egg laying and the start of incubation was several days longer than observed in the earlier studies. The length of incubation shifts was shorter than in the 1980s.

**Jen Rock** (Halifax, Nova Scotia [NS]) reported that 2008 marked the 19th year in which the Laskeek Bay Conservation Society (LBSCS) has monitored seabirds on Limestone Island, QCI. Rock was camp supervisor/ biologist in 2008. LBSCS's main projects were monitoring departures of Ancient Murrelets chicks, and reproductive success and chick diets of Black Oystercatchers (the latter project included portions of Gwaii Haanas National Park). The team also monitored breeding activity of Cassin's Auklets and Pigeon Guillemots (*Cephus columba*). They conducted regular

surveys by boat to determine the distribution and abundance of marine birds and mammals, using a series of nearshore and offshore transects. **Rock Pattison** and **Jake Pattison** (interpreter/assistant biologist, Queen Charlotte City, QCI) were assisted by a diverse group of volunteers who committed their time on a weekly basis. The number of Ancient Murrelet chicks departing the island was the lowest recorded to date, a trend that appears specific to this colony. Predation could explain the decline in chick departure numbers, although the cause remains unknown. Otherwise, LBC's monitoring of seabirds and water birds revealed generally similar trends as in previous years.

A survey of seabirds between Washington and Alaska, conducted by **Shannon Fitzgerald** of the U.S. National Oceanographic and Atmospheric Administration, included coastal waters of BC (see Washington-Oregon regional report).

**Gal Ribak** (Technion, Israel) conducted laboratory research on the biomechanical aspects of foraging in avian divers. Species studied this year included Great Cormorants (*Phalacrocorax carbo*) and Barrow's Goldeneyes (*Bucephala islandica*). Goldeneyes were studied in collaboration with **David R. Jones** (UBC).

#### CENTRAL AND EASTERN CANADA

**Gail Fraser** of York University (YU, Toronto), **Greg Robertson** (CWS, St. John's, Newfoundland [NL]) and **Janet Russell** (Alder Institute, NL) continued monitoring Manx Shearwaters (*Puffinus puffinus*) and Leach's Storm-Petrels on Middlelawn Island, NL. With assistance from **Tony Diamond** and **Dorothy Diamond** (Atlantic Cooperative Wildlife Ecology Research Network [ACWERN] at the University of New Brunswick) and **Leesa Fawcett** (YU), they banded 131 new Leach's Storm-Petrels and recaptured 201, and banded 24 new Manx Shearwaters and recaptured 13. There appeared to be lots of active burrow digging by Manxes; however, only three active nests were found after

several days of searching empty burrows (1 large downy chick, 1 egg, and one adult with egg, plus two nests with cold eggs). **Dave Andrews** (YU) successfully defended his MSc thesis on cormorants, and **Sharis Lakfard** (YU) continued her studies on Common Terns (*Sterna hirundo*) at Tommy Thompson Park in Toronto. Fraser continued her research on raccoon (*Procyon lotor*) predation on Black-crowned Night Herons (*Nycticorax nycticorax*).

**Vicki Friesen** (Queens University [QU], Kingston, ON) continues to focus on evolutionary and conservation genetics of seabirds. Former PhD students **Andrea Smith**, **Elena Gomez-Diaz** and colleagues published a paper in *Proceedings of the National Academy of Sciences USA* describing evidence for sympatric speciation in storm-petrels, one of the best examples of this controversial model for a bird. BSc students **Anna Bailie** and **Previn Gulavita** found evidence for sympatric speciation in the Guadalupe subspecies of Leach's Storm-Petrels. PhD students **James Morris-Pocock** and **Scott Taylor** published a paper in *Molecular Ecology* on mechanisms of population differentiation in murre; this study shows the importance of considering non-equilibrium conditions in predicting the extent of population genetic structure in high-latitude seabirds. Morris-Pocock's main research involves testing the importance of foraging distribution in shaping population genetic structure in seabirds using Brown (*Sula leucogaster*) and Red-footed boobies (*S. sula*) as model systems. Taylor's main focus is on testing the stepping-stone model of parapatric speciation in seabirds, using Blue-footed (*S. nebouxii*), Peruvian boobies (*S. variegata*), and Brown Pelicans (*Pelecanus occidentalis*) as model systems. **Petra Deane** recently began a MSc project investigating evidence for sympatric speciation in the populations of Band-rumped Storm-Petrels (*Oceanodroma castro*) on Cape Verde Island, Ascension, and on St. Helena. Research associate **Tim Birt** (QU) and colleagues (primarily **Harry Carter**) are conducting a conservation genetics study of Xantus's

Murrelets (*Synthliboramphus hypoleucus*). Friesen and Birt continue to seek samples and funding for a conservation genetics study of Kittlitz's Murrelets (*Brachyramphus brevirostris*), which has been proposed for Threatened listing under the US Endangered Species Act. Please contact Friesen (vlf@queensu.ca) if you can assist with samples.

**Greg Robertson** (CWS, St. John's, NL) reported that 2008 was a relatively quiet year with no large mortality events of marine birds reported in the province. Field work focused on banding operations and sampling for avian influenza (along with **Hugh Whitney**, Animal Health Division, Province of Newfoundland and Labrador, and **Andrew Lang**, MUN). **Steve Votier** and **Tony Bicknell** (University of Plymouth, UK) visited Gull Island, Witless Bay (NL) to sample Leach's Storm-Petrel DNA as part of an Atlantic-wide investigation of population structure. In spite of a late spring, seabird productivity was generally average in NL.

**Jean-François Rail**, **Richard Côté** and **Jean-François Ouellet** (CWS, Québec City) surveyed the seabird colonies along the Gaspé Peninsula. Preliminary results show that the positive population trends observed between 1989 and 2002 continued for most species between 2002 and 2008. Large increases were again noted in Great Cormorant, Common Eider (*Somateria mollissima*), Ring-billed Gull (*Larus delawarensis*), Razorbill (*Alca torda*) and Black Guillemot (*Cepphus grylle*). In contrast, a downward trend in Herring Gull (*Larus argentatus*) numbers along the Gaspé Peninsula appears to have been constant since 1979, including a 35% decline during the 2008-2008. The 2008 estimate (3,323 pairs) is only a third of that for 1979. Results have yet to be analysed for another declining species, the Black-legged Kittiwake (*Rissa tridactyla*). Finally, two species that showed stable numbers between 1989 and 2002 showed divergent trends in 2002-2008: Common Murres decreased by 38%, while Double-crested Cormorants (*Phalacrocorax auritus*) increased by 52%.

**Rail**, assisted by **Myriam Drolet-Lambany** (CWS/EC, Québec, QC) and a few volunteers, monitored breeding success and chick growth in a colony of Razorbills on Le Gros Pêlerin, and in a colony of Black-legged Kittiwake on île Bicquette; both islands are located in the St. Lawrence River Estuary. The project was financed by the State of the St. Lawrence Monitoring Program. The Razorbill colony fared very well, whereas heavy predation by gulls and a red fox (*Vulpes vulpes*) left only one kittiwake egg to hatch, out of a hundred nests.

**Rail**, **Pierre Brousseau** and **Louis Lesage** (CWS, Québec City) managed to reach Akpatok Island (NU) as part of the IPY project "Seabirds Help Detect Arctic Ecosystem Change." After many problems, they finally arranged to have Inuit boatman **Tommy Kudluk** take **Sandy Suppa** (technician with the Makivik Corporation) to the Island. Suppa collected 31 Thick-billed Murres (*Uria lomvia*), which were sent to CU for analyses of stomach contents and stable isotopes.

**Don Dearborn** (Bucknell University [BU]) has been collaborating with **Mark Haussmann** (BU) and **Bob Mauck** (Kenyon College) to study nestling growth and coordination of parental care in Leach's Storm-Petrels on Kent Island in the Bay of Fundy.

**Alex Bond** of Memorial University of Newfoundland collected productivity and survival data on Least and Crested Auklet (*Aethia pusilla* and *A. cristatella*) productivity at Sirius Point, Kiska Island for the second year of his PhD program. Alex is also investigating the interaction and dynamics of rats and auklets (see Alaska regional report).

#### ARCTIC CANADA

**Paul Smith** (PhD candidate, National Wildlife Research Centre, Environment Canada and Dept. of Biology, Carleton University [CU]), **Kyle Elliott**, and **Kerry Woo** visited Digges Sound (NU) during July and August to study murre breeding ecology and to monitor colonies of Iceland Gulls (*Larus glaucoideus*) and Glaucous Gulls (*L. hyperboreus*). Digges Sound is home to Canada's largest



aggregation of Thick-billed Murres, with nearly a million individuals estimated to breed or summer within its boundaries. This effort was a component of an IPY project led by **Tony Gaston**, **Bill Montevecchi** (MUN), and **Gail Davoren** (UM, Winnipeg, MB). The larger IPY project seeks to understand better the effects of a changing climate on the ecology of seabirds from the North Atlantic to the High Arctic. At their camp on East Digges Island, Smith, Elliott and Woo studied the diet of adult murres and their chicks, which they will compare with historical data. Diet observations were correlated with dive behavior, using temperature-depth loggers. They also deployed leg-mounted geolocators to augment the understanding of winter range previously based on band recoveries. These data will be combined with data collected at several other arctic colonies to provide a range-wide assessment of the impact of environmental change on the breeding ecology of Thick-billed Murres.

**Tony Gaston** directed the 2008 work at Coats Island, northern Hudson Bay, where the Thick-billed Murre colony was visited again as part of EC's long-term project. **Jennifer Provencher** (MSc candidate, UVIC), **Kerry Woo** and **Kyle Elliott** (CWS contract researchers) and **Paul Smith** (CU) arrived on 13 July; some went on to Digges Sound and were replaced by **Josiah Nakoolak** (research assistant, Coral Harbour, NU), **Mark Hipfner**, and **Brianne Addison** (PhD candidate, University of Missouri, St. Louis, Missouri). The team departed on 17 August. Many long-term objectives were carried out, including daily attendance counts, monitoring of breeding biology, time-depth-recorder deployment, and measurements of nestling growth. Several other studies were initiated this year, including parasite monitoring. Little chick banding was done this year, due to strong winds and heavy rainfall during the chick-rearing period; however, more adults were banded than usual. The wet weather resulted in many dead chicks being observed in puddles on the cliffs, as well as a few adults that slipped, fell into crevices, and became

stuck. Capelin (*Mallotus vilosus*) was the most abundant fish during five feeding watches, following the trend of the last several years. Very little fox predation was observed, so that many adults nesting in peripheral regions of the colony had high chick fledging success. Glaucous Gulls, which nest among the murres, also had high success. One polar bear (*Ursus maritimus*) was seen on the colony but was not observed taking any birds or eggs.

#### OTHER WORK

**Alex Bond**, PhD candidate at MUN, has been working on Kiska Island, Aleutian Islands, Alaska on Least Auklet diet and demography and their relationships with rats (see Alaska regional report).

**Ken Morgan** (CWS, Sidney, BC) and other members of Canada's Short-tailed Albatross /Pink-footed Shearwater (*Puffinus creatopus*) Recovery Team finalized the two-species Recovery Strategy. Other team members (past and present) are **Louise Blight**, **Myke Chutter** (BCMOE, Victoria, BC), **Peter Hodum** (Oikonos-Ecosystem Knowledge, Seattle), **Tamee Mawani** (Fisheries and Oceans Canada, Vancouver, BC), **Nadine Parker** (Transport Canada, Vancouver, BC), **Jo Smith** (UW), and **Ross Vennesland** (PCA, Vancouver, BC). The document can be downloaded at [http://www.sararegistry.gc.ca/document/default\\_e.cfm?documentID=1354](http://www.sararegistry.gc.ca/document/default_e.cfm?documentID=1354)

Between March and June, Morgan was on leave from work to volunteer at the office of the Secretariat to the Agreement on the Conservation of Albatrosses and Petrels (ACAP) in Hobart, Tasmania. Three draft reports on the status of the North Pacific albatrosses were developed, in collaboration with **Greg Balogh** (USFWS, Anchorage), **Maura Naughton** (USFWS, Portland, OR) and **Kim Rivera** (National Oceanographic and Atmospheric Administration, Juneau). The documents will be part of the process to have the albatrosses included under the Agreement. The draft reports were presented by Naughton and Balogh to the ACAP Advisory Committee in Cape Town in August 2008 (see *Pacific*

*Seabirds* 35:10, 2008 for more on this meeting), and were favorably received. It is hoped that the North Pacific albatrosses will be added to the list at the next meeting of ACAP in April 2009. Morgan also continued monitoring seabirds and marine mammals in the northeast Pacific (with contractor **Mike Bentley**, Victoria, BC), and for the second year in a row, he worked with **Carina Gjerdrum** (CWS, Dartmouth, NS) and **Ed Carmack** (Department of Fisheries and Oceans, Sidney, BC) to place observers on Canadian Coast Guard ships, who surveyed seabirds and marine mammals along Canada's three maritime coasts.

**Rob Ronconi** completed his PhD with **Alan Burger** at UVIC. His work on Marbled Murrelets and other alcids included papers on habitat selection, foraging ecology, distance sampling methodology, and interspecific competition. Ronconi has now begun a two-year postdoctoral fellowship with **Marty Leonard** (Dalhousie University, Halifax) studying the diets, habitat use, and migrations of Greater (*Puffinus gravus*) and Sooty Shearwaters (*P. griseus*). The work is an extension of a four-year collaboration with **Heather Koopman**, **Andrew Westgate** and **Sarah Wong** of the Grand Manan Whale and Seabird Research Station (Grand Manan Island, NS). Associated tracking studies of shearwaters were also launched off the coast of Newfoundland in collaboration with **Bill Montevecchi** and **April Hedd** (MUN).

**Spencer Sealy** (UM, Winnipeg, Manitoba) reports that he and **Harry Carter** continue to plug along on work initiated more than 25 years ago involving analyses of vagrancy in auks (see details in *Pacific Seabirds* 29:109, 2002). Since 1999, several papers have been published and two detailed analyses are nearing completion: vagrancy in auklets (*Aethia* spp.), and relationships between inland vagrancy and wrecks of Dovekies (*Alle alle*). Interpretations of these analyses are being couched in terms of the species' breeding biology, oceanic features, and weather. Sealy and Carter are also examining Ancient



Murrelet family groups off Vancouver Island and the west coasts of Washington and Oregon, far from the nearest nesting colonies. Sealy and **Wayne Campbell** (Biodiversity Centre for Wildlife Studies, Victoria, BC) have compiled records of vagrancy in the Red-legged Kittiwake (*Rissa brevirostris*) inland and along the west coast of North America south of Alaska, and are preparing this for publication.

## WASHINGTON-OREGON

Compiled by **Don Lyons**

### MARBLED MURRELETS

**William Ritchie** of the Washington Department of Fish and Wildlife (WDFW) consulted with Biologist **Marie Fernandez** of Willapa National Wildlife Refuge, U.S. Fish and Wildlife Service (USFWS), to enhance and restore suitable Marbled Murrelet (*Brachyramphus marmoratus*) nesting habitat on former industrial timberlands acquired by the refuge. While working on this forestry prescription, he also consulted with **Tom Kollasch** and **Bill Lecture** with The Nature Conservancy (TNC) and contract forester **Tom Scroggins**. WDFW has worked with TNC and refuge scientists during the past two years designing a monitoring plan, gathering baseline data on Marbled Murrelet activity, and collecting stand-level forest inventory data for this project. Treatment sites are adjacent to small patches of older "legacy" trees in a second-growth forest, with the goal of enhancing the forest around these stands and accelerating the onset of older forest conditions. Additional large-scale thinning of young plantation forests is underway. Future work is planned for adjacent forests in TNC's Ellsworth Creek watershed.

**William Ritchie** and others at WDFW continue to examine the effects of a major winter storm that hit southwestern Washington and northwestern Oregon in December 2007. Thousands of acres of coastal forestlands with Marbled

Murrelet nesting habitat were destroyed or severely damaged. Dialogue continues with state and private landowners, the Washington Department of Natural Resources (WDNR), and USFWS to assess the damage and to examine the adequacy of nest-site buffer protections. We have implemented strategies to enhance the protection of remaining habitat and improve the efficiency of salvage operations, while meeting regulatory obligations. In some cases, WDFW is working with land managers to develop Special Wildlife Management Plans for habitat at Marbled Murrelet sites.

**Ritchie** also participated in capture operations for an ongoing telemetry study of Marbled Murrelet breeding ecology in northwestern Washington State, which is being conducted by **Martin Raphael** and **Tom Bloxton** of the U.S. Forest Service-Pacific Northwest Research Station (PNW).

WDNR Northwest Region Biologist **Peter McBride**, in conjunction with **William Ritchie** (WDFW), has completed an alternative scheduling method for Marbled Murrelet forest breeding surveys in high-elevation habitats. This method will be employed for surveying selected sites in rugged, mountainous locations where early season access is limited and potentially hazardous. This method was developed using geographically specific data and validated with paired surveys.

Turnstone Environmental Consultants conducted Marbled Murrelet surveys on state lands in the Coast Range of Oregon, under contract to the Oregon Department of Forestry (ODF). Surveys covered 6 ODF districts (Astoria, Tillamook, Forest Grove, Western Lane, Coos Bay and West Oregon). Surveyors visited a mixture of first, second and multi-year survey sites and conducted almost 1,900 surveys at 227 unique sites and 1,042 unique stations. All Marbled Murrelet surveys by Turnstone (there and elsewhere) were conducted according to PSG's 2003 protocol. Murrelets were present during 236 surveys and "occupied" behavior was noted during 39 surveys. **Tom Williamson** was the

Turnstone project manager. District representatives for ODF were **Jenny Johnson** in Astoria, **Nick Stumpf** in Tillamook, **Laurie O'Nion** in Forest Grove, **Tom Mickel** and **Ole Buch** in Western Lane, **Ryan Greco** in Coos Bay and **Eric Foucht** in West Oregon. **Matt Gostin** was the ODF contract administrator and primary contact.

Turnstone biologists completed a 2-year Marbled Murrelet survey contract for the City of Cannon Beach, Oregon. They conducted intensive and biologically acceptable surveys for Marbled Murrelets, as part of an impact assessment for future development adjacent to the city's wastewater treatment facility. Five surveys were performed at one site. Tom Williamson was the project manager; **Rainmar Bartl** was the city representative. Turnstone biologists also conducted Marbled Murrelet surveys for City of Corvallis in the coast range of Oregon, in support of developing a long-term management plan for the city's watershed. Three sites were delineated within the watershed and a total of 20 surveys were conducted. Jeff Reams of Turnstone was the project manager for Turnstone and **Gary Rodgers** was the City of Corvallis representative.

Turnstone conducted Marbled Murrelet pre-management surveys for Forest Capital Partners in the coast range of Oregon, in support of proposed timber management regimes. A total of 64 surveys were conducted at 12 sites. Marbled Murrelets were detected at one site during the 2008 season. **Jeff Reams** was the Turnstone project manager and **Jennifer Bakke** was the Forest Capital Partners representative. Plum Creek lumber company also contracted Turnstone to augment their pre-management Marbled Murrelet survey efforts in 2008. Turnstone biologists surveyed several sites in the central Oregon coast range, as needed. **Jeff Reams** of Turnstone was the project manager and **Jeff Light** was the Plum Creek representative.

Turnstone finished the second year of surveys on the southern Washington coast in support of a proposed wind energy project. Two sites have been

delineated and a total of 18 surveys per year have been conducted. No Marbled Murrelets have been detected at either site to date. Tom Williamson acted as the Turnstone project manager.

**Martin Raphael** and **Tom Bloxton** of PNW continued collaborating on studies of Marbled Murrelets in Puget Sound, the Strait of Juan de Fuca, and Hood Canal during 2008. They completed the 9th year of long-term population monitoring at sea under the Northwest Forest Plan (NWFP), along with researchers elsewhere in Washington, Oregon, and northern California. The NWFP is a large-scale ecosystem management plan for federal lands in this part of the U.S. Raphael and Bloxton surveyed murrelets and other seabirds and marine mammals in Recovery Zone 1, from the San Juan Islands to Olympia in Puget Sound and the Strait of Juan de Fuca. They also continued collecting baseline data on both within-season and annual changes in distributions, densities, and productivity of murrelets in the San Juan Island archipelago, Admiralty Inlet, and Hood Canal. These in-depth data have not been collected in the latter two water bodies since 2003; we plan to repeat the collections at five-year intervals into the foreseeable future.

The fifth season of capturing and radio-tagging Marbled Murrelets at sea around the Olympic Peninsula, Washington yielded 18 tagged adults. Two nests were located for these tagged birds, including our first record of a bird tagged on the Olympic Peninsula nesting in the Cascade Mountains. The bird was tagged in Admiralty Inlet near Port Ludlow in May; in June it was found nesting in the central Cascades near North Bend, 90 km away. This nest was apparently successful, as the radio-tagged adult foraged near Kingston, WA, 75 km from its nest. Our other nest, on the northern Olympic Peninsula, failed during the chick stage. This work was completed with support and cooperation from **Richard Bigley**, **Peter Harrison**, **Scott Horton**, **Andrew Horton**, and **Dan Ramos** of the Washington Department of Natural Resources, and **Deanna Lynch** of the USFWS.

**Scott Pearson** and **Monique Lance** (WDFW) conducted surveys for Marbled Murrelets on the outer coast of Washington from mid May to July. WDFW has been monitoring Marbled Murrelets at sea since 2000, along with researchers from federal and state agencies in Washington, Oregon and California. The goal of monitoring is to estimate Marbled Murrelet populations and trends for the area between the Washington–Canada border and San Francisco. All seabirds are recorded along transects; other species of interest included record numbers of Ancient Murrelets (*Synthliboramphus antiquus*) and Cassin's Auklets (*Ptychoramphus aleuticus*), as well as a Manx Shearwater (*Puffinus puffinus*) and a Fork-tailed Storm-Petrel (*Oceanodroma furcata*). Surveys were also conducted on historic Tufted Puffin (*Fratercula cirrhata*) colonies on the outer coast to determine occupancy.

**Kim Nelson** of Oregon State University (OSU) and her cooperators continued their study of Marbled Murrelets in the Port Snettisham area of Southeast Alaska (see Alaska regional report).

#### CASPIAN TERNS AND DOUBLE-CRESTED CORMORANTS

Research on predation by seabirds on salmon smolts (*Oncorhynchus* spp.) in the lower Columbia River continued under OSU, the U.S. Geological Survey–Oregon Cooperative Fish and Wildlife Research Unit (USGS), Real Time Research (RTR), and their cooperators. They studied the largest known breeding colonies of Caspian Terns (*Hydroprogne caspia*) and Double-crested Cormorants (*Phalacrocorax auritus*) on the west coast, both on East Sand Island in the Columbia River estuary. They also studied colonies of Caspian Terns, Double-crested Cormorants, and several gull species on the mid-Columbia River, the Columbia Plateau, and elsewhere in the Pacific Northwest.

The size of the Caspian Tern colony on East Sand Island was approximately 10,670 pairs in 2008, compared to approximately 9,850 in 2007. Juvenile salmonids comprised 29% of the diet of

East Sand Island terns in 2008, similar to 2007. Northern anchovy (*Engraulis mordax*) and surfperch (Embiotocidae) were the most prevalent non-salmonid prey in tern diets. The size of the Double-crested Cormorant colony on the island was approximately 10,950 nesting pairs in 2008, compared to approximately 13,770 in 2007. While colony size is down by 20% from 2007, it has increased dramatically since the colony was first noted 20 years ago. In 2008 we also initiated satellite telemetry of East Sand Island cormorants to investigate post-breeding dispersal and location of wintering areas.

East Sand Island continues to be the largest known post-breeding roost site for California Brown Pelicans (*Pelecanus occidentalis californicus*), a subspecies currently listed as endangered. Over 12,000 Brown Pelicans were counted on the island in early to mid-September.

Crescent Island is approximately 500 km upriver from the estuary, near the confluence of the Snake and Columbia rivers in eastern Washington. The Caspian Tern colony on this island was estimated to be approximately 390 nesting pairs in 2008, up from 355 in 2007. This colony remains the largest Caspian Tern colony in the Columbia Plateau Region and the third largest in the Pacific Northwest. Juvenile salmonids comprised 68% of the diet of Crescent Island terns in 2008, similar to diet composition during 2000–2007.

Foundation Island, located 9 km upriver from Crescent Island, has the largest Double-crested Cormorant breeding colony on the mid-Columbia River. This tree-nesting colony consisted of at least 357 nesting pairs in 2008, up from about 334 in 2007. The largest Double-crested Cormorant colony in the Columbia Plateau Region, however, is on Potholes Reservoir, where around 1000 pairs nested in trees in 2008. This was similar to recent years.

Implementation of the Caspian Tern Management Plan was initiated in 2008, when the U.S. Army Corps of Engineers built two 0.4-ha nesting islands, one at Crump Lake in southeastern Oregon and



the other at Fern Ridge Reservoir near Eugene, Oregon. Caspian Tern decoys and sound systems playing tern calls were deployed at both sites, which were monitored for tern activity throughout the breeding season. Approximately 430 Caspian Tern pairs were attracted to nest on the new island in Crump Lake. The birds nested successfully and produced about 145 fledglings. Tui chub (*Gila bicolor*) and catfish (Ictaluridae) made up the bulk of tern diets. No Caspian Terns nested in 2008 at the new island in Fern Ridge Reservoir. However, based on a review of video recordings, at least nine different Caspian Terns visited the island on several occasions.

Dungeness Spit is in Dungeness National Wildlife Refuge, on the north coast of the Olympic Peninsula, Washington. We continued our monitoring of its Caspian Tern nesting colony. Approximately 880 pairs of terns nested there in 2008, down from approximately 1,150 in 2007. This remains the second largest Caspian Tern colony in the Pacific Northwest.

This year's research team included **Dan Roby** (USGS/OSU), **Jessica Adkins**, **Dan Battaglia**, **Max Bockes**, **Karen Fischer**, **Nathan Hostetter**, **Pete Loschl**, **Don Lyons**, **Frank Mayer**, **Lauren Reinalda**, and **Yasuko Suzuki** (OSU), and **Ken Collis**, **Melissa Carper**, **Allen Evans**, and **Mike Hawbecker** (RTR), plus a number of seasonal technicians and volunteers. The interagency Caspian Tern Working Group also participated, including the National Marine Fisheries Service, U.S. Army Corps of Engineers, USFWS, Oregon Department of Fish and Wildlife, WDFW, Idaho Department of Fish and Game, Columbia River Inter-Tribal Fish Commission, and others. This study was funded by the Bonneville Power Administration, the Northwest Power and Conservation Council, and the U.S. Army Corps of Engineers.

Additional monitoring of the Caspian Tern Management Plan in San Francisco Bay, California, is included in the California regional report.

#### WASHINGTON—OTHER SPECIES

**Scott Pearson**, **Peter Hodum**, **Julia Parrish**, and **Tom Good** continued

their multi-year study comparing foraging ecology and reproductive success of Rhinoceros Auklets (*Cerorhinca monocerata*) on Protection and Tatoosh islands, Washington. They added Destruction Island as a study site in 2008. They are assessing diet composition and quality, coupled with breeding phenology and measures of success. They are comparing parameters between years and habitats, with Protection representing inshore Puget Sound, Tatoosh the transitional Outer Coast, and Destruction the Outer Coast marine habitat. Breeding success has been consistently high across sites and years. The project also includes multi-year monitoring of the Tufted Puffin population on Tatoosh, and a survey of current occupancy on historically occupied breeding sites in the San Juan Islands, Strait of Juan de Fuca, and on the outer coast. In the Strait and San Juans, only Smith and Protection islands have retained breeding populations. Results of surveys in 2007 and 2008 indicate a 38% decline in the number of historic breeding islands that are still active.

**Shannon Fitzgerald** of the National Oceanic and Atmospheric Administration (NOAA—Fisheries), assisted by WDFW biologist **William Ritchie**, conducted a seabird survey from Puget Sound to Juneau, Alaska. The route transited through the inland passages of British Columbia and Southeast Alaska. The survey platform was the NOAA ship *John N. Cobb*, a 93-foot vintage research vessel (ca. 1950). Ritchie also worked with the USFWS on s surveys around Afognak and surrounding islands in the Gulf of Alaska (see Alaska regional report).

**Joe Evenson**, **Bryan Murphie**, and **Tom Cyra** (WDFW—Game Division) are continuing low-level aerial surveys in winter 2008-2009, which have been conducted since 1992 throughout Washington's inner marine waters. The flights are part of the marine bird component of WDFW's annual Puget Sound Assessment and Monitoring Program (PSAMP). Maps of density indices for selected species and other data products are available for the 1992-2008 winters and the 1992-1999 summer surveys at the

following web site: <http://wdfw.wa.gov/mapping/psamp/>. These data are also accessible through the Wildlife Resources Data Section, Washington Department of Fish and Wildlife, in Olympia.

**Evenson**, **Nysewander**, **Cyra**, and **Murphie** initiated a large-scale study of molt in scoters (*Melanitta* spp.). The project aims to mark and recapture birds over the entire molt period to quantify when and where the various scoter species and sexes molt. Flightless birds are driven into floating nets, captured, and banded at sites near Oak Harbor and Padilla Bay. Many biologists and volunteers assisted with boat operations, net deployment and retrieval, removing birds from nets, and data recording. A study of capture feasibility on scoters during molt, using specially modified gill nets to increase banding effort, began in September 2007 and was expanded in 2008. Over 1300 Surf and White-winged Scoters (*Melanitta perspicillata* and *M. fusca*) were banded on 22 capture days between 1 Aug and 30 Sep 2008, at four areas: Padilla Bay, Oak Harbor, Boundary Bay, and the mouth of the Fraser River. This effort was highly successful, due to extensive collaboration between WDFW staff, **Dan Esler** (Simon Fraser University, British Columbia), **Eric Anderson**, **Jenn Barrett**, and numerous volunteers from British Columbia and Washington State. For more information, contact Joe Evenson at [evensjre@dfw.wa.gov](mailto:evensjre@dfw.wa.gov).

WDFW also implemented a study of sex and age ratios of scoters and Harlequin Ducks (*Histrionicus histrionicus*) in Feb 2008, to examine hatch-year recruitment. The sampling scheme involved 28 days of boat surveys that covered all wintering locales of Harlequin Ducks and most wintering concentrations of scoters known to occur in the inner marine waters of Washington State. The observations are scheduled to be repeated in Feb 2009.

Other WDFW projects on breeding marine birds are continuing or evolving. Two prominent ones are studies on Black Oystercatchers (*Haematopus bachmani*), and archiving of results from 1999-2003



breeding surveys of Pigeon Guillemots (*Cepphus columba*) throughout the inner marine waters of Washington State. Any questions or interest on these can be directed to **Joe Evenson**, 360-902-8137, **Dave Nysewander**, 360-902-8134, **Ruth Milner** (360-466-4345x265), or **Tom Cyra** (425-379-2307).

#### OREGON—OTHER SPECIES

**Shawn W. Stephensen**, **Amanda Gladics**, **Amy Kocourek**, and **Jason Ziegler** of the Oregon Coast National Wildlife Refuge Complex (OCNWR) conducted a census of burrow-nesting seabirds in Jun–Aug 2008. Species include Pigeon Guillemot, Cassin's Auklet, Rhinoceros Auklet, Tufted Puffin, Leach's Storm-Petrel (*Oceanodroma leucorhoa*), and Fork-tailed Storm-Petrel. The survey area included all rocks, reefs, islands, and mainland along the Oregon coast. A precise population estimate of nesting storm-petrels was obtained by determining burrow density, burrow occupancy, and nesting area, calculated with the aid of LIDAR (Light Detection and Ranging) equipment and DEM (Digital Elevation Modeling) images. The most recent coast-wide survey was completed in 1988, and many colonies and species populations have changed since then. Preliminary results indicate the Tufted Puffin population has declined by an order of magnitude compared to 1988 data.

**Brian Cooper** and **Peter Sanzenbacher** of ABR, Inc. (Fairbanks, Alaska) collaborated with **Roy Lowe** and **Dave Ledig** (USFWS) to examine the efficacy of radar techniques for obtaining indices of abundance of Leach's Storm-Petrels at several nearshore breeding colonies in Oregon. In addition, we used night-vision techniques to help document mammalian predator activity on the colonies. Objectives of the study were (1) to determine the feasibility of radar as a non-intrusive (off-site) means to derive population indices for colonies of nocturnal seabirds; (2) compare radar population indices of Leach's Storm-Petrel populations with traditional estimates collected

by USFWS in the summer of 2008, using on-site grubbing, playback, and burrow-cams; (3) make among-colony comparisons of radar counts, first arrival times, and activity patterns during the incubation/chick rearing period; and (4) determine the feasibility of night-vision technology for determining presence or absence of nocturnal avian and mammalian predators and estimating their levels.

**Shawn Stephensen** and pilot **Ray Bentley** (USFWS) conducted an aerial census of California Brown Pelicans on the coast of Oregon on 4–5 Sep 2008. The survey extended from Smith River, Del Norte County, northern California to Willoughby Rock, Grays Harbor County, southern Washington. All rocks, reefs, islands, coastal beaches, and waters up to 1 km offshore were surveyed from an altitude of 70 to 270 meters above ground level. The aircraft was a fixed-wing Cessna 182; the total flight time was 11.0 hours. A total of 12,425 individual birds were counted in 2008, in comparison to 18,769 in 2007. The largest congregation of birds (3,867 individuals) was located on East Sand Island, Columbia River.

#### OTHER WORK

WDFW has begun technical review of a conceptual framework to guide post-construction monitoring and mitigation, with the aim of reducing adverse impacts from wind energy facilities. This is a collaborative effort, which the U.S. Department of Interior will use to develop a national wind power policy. WDFW has established a Wind and Water Energy Section within its Habitat Program. The department has increasingly been called on to review preliminary survey plans for proposed wind-power projects in coastal counties.

The Port Townsend Marine Science Center, Port Townsend, Washington (**Jean Walat** and colleagues) is conducting a survey of plastics consumption in Glaucous-winged gulls (*Larus glaucescens*). They are studying birds nesting on Protection Island, the largest colony of this species in Puget Sound. Trained

volunteers have dissected more than 200 boluses, which were collected with the help of the Seabird Ecology Team, to determine the amount of plastic has been ingested, as well as other inorganic materials like cigarette butts, glass, and aluminum foil. Depending on results, this project may be followed up with studies of other breeding areas. Work is funded by the Washington Department of Ecology.

**Ed Melvin** and **Troy Guy** of Washington Sea Grant and **Rob Suryan** of OSU are currently working with NOAA–Fisheries to assess the potential for interactions with albatrosses and other seabirds by the hook-and-line and trawl fishing fleets of Washington, Oregon and California. They plan to recommend seabird-avoidance measures (in consultation with the fishing industry), and conduct seabird avoidance workshops at ports on the west coast. They also are working to make streamer lines available free of charge to the west coast hook-and-line fleet.

**Nathalie Hamel** is in the last throes of her PhD in the School of Aquatic and Fishery Sciences at the University of Washington. Her study focuses on assessing the vulnerability of seabirds to bycatch, using telemetry and data derived from beached-bird monitoring programs. She was awarded the Marc Hersman Marine Policy fellowship starting in December 2008 at the Department of Ecology, Washington. As a fellow, she will be reviewing the Washington Coastal Zone Management Program and providing recommendations to update the law.

**Stephani Zador** successfully defended her PhD dissertation in September 2007 at the University of Washington. Her work included studies of fishery interactions with Short-tailed Albatrosses in Alaska and Common Murres (*Uria aalge*) in the Pacific Northwest. Although she is currently doing a post-doc on arrowtooth flounders (*Atheresthes stomias*) in the Bering Sea, she continues to be involved with birds through an ongoing study of seabird attraction to trawling discards in Alaska.

## NORTHERN CALIFORNIA

Compiled by Craig Strong

## MARBLED MURRELETS

The Marbled Murrelet (*Brachyramphus marmoratus*) Effectiveness Monitoring Program continues to monitor the status and trend of Marbled Murrelet populations and nesting habitat. This is an interagency effort to evaluate the effectiveness of the Northwest Forest Plan (NWF Plan). The Population Monitoring Team has monitored murrelet populations annually from boats since 2000, covering about 8,806 km<sup>2</sup> (3,400 mi<sup>2</sup>) of coastal waters throughout murrelet conservation Zones 1 through 5 (US-Canada border to San Francisco Bay). In 2008, Washington surveys were led by **Marty Raphael** and **Tom Bloxton** (U.S. Forest Service- Pacific Northwest Research Station [PNW]) in Zone 1 (Puget Sound through Straits of Juan de Fuca), and by **Scott Pearson** and **Monique Lance** (Washington Department of Fish and Wildlife) in Zone 2 (outer coast). Oregon surveys were led by **Craig Strong** (Crescent Coastal Research). In California, **Sherri Miller**, with crew leader **Elias Elias** (U.S. Forest Service-Pacific Southwest Research Station [PSW]) led surveys in Zone 4 (Coos Bay, Oregon south through Humboldt County, California), and Craig Strong led surveys in Zone 5 (Mendocino through Marin Counties). Annual population estimates for the 5-zone area have ranged from about 17,400 to 23,700 murrelets (95% confidence limits of 12,800 to 29,000 birds). Population surveys will continue in 2009. The Habitat Monitoring Team continues work on modeling murrelet nesting habitat relationships across the 5 conservation zones, for an assessment of murrelet nesting habitat through the first 15 years of the NWF Plan (1993-2008). This team includes Marty Raphael, **Kim Nelson** (Oregon State University [OSU]), **Sherri Miller**, **Jim Baldwin** (PSW), and **Deanna Lynch** and **Rich Young** (U.S. Fish and Wildlife Service [USFWS]). Other contributors to the monitoring program included **Beth Galleher** (PNW) and **CJ Ralph** (PSW), plus the many

seasonal technicians who made the population surveys possible. **Gary Falxa** (USFWS) coordinates the NWF Plan murrelet monitoring program. A report on results of the monitoring program through 2003 is available at [http://www.fs.fed.us/pnw/pubs/pnw\\_gtr650.pdf](http://www.fs.fed.us/pnw/pubs/pnw_gtr650.pdf). A report on results from 2003 through 2007 will be available at <http://www.reo.gov/monitoring/mm-overview.shtml>, and includes a preliminary population trend analysis based on 8 years of population monitoring data (2000-2007).

**Steve Singer** of the Santa Cruz Mountains Murrelet Group and **Tom Hamer** of Hamer Environmental (HE) are continuing a long-term radar study monitoring Marbled Murrelet use of the Gazos Creek Canyon flight corridor. Gazos Creek Canyon is one of only five flight corridors used by murrelets in the Santa Cruz Mountains. Although the study is not yet complete, the number of birds detected in 2008 was slightly lower than in 2006. The project also includes ground surveys of murrelet detections and flight behaviors at Gazos Mountain Camp, which has become the most active inland murrelet site in the Santa Cruz Mountains. Field biologists were **Erin Colclazier** of HE and **Portia Halbert** of the California State Parks Department (CSPD). The project is sponsored by the Office of Oil Spill Prevention and Response (OSPR) of the California Department of Fish and Game (CDFG), and the Sempervirens Fund.

**Steve Singer** also assisted **Portia Halbert** and the CSPD in developing a Grounded Marbled Murrelet Protocol for use when fledglings are found on the ground in or near old-growth redwood stands in the Santa Cruz Mountains. Historically, one or more fledglings are found on the ground each year, often by park visitors. This protocol provided guidance to park staff and docents in how to document and care for the birds until they can be transported to an appropriate rehabilitation facility.

**Zach Peery** and **Laurie Hall** (Moss Landing Marine Laboratories) and **Laird Henkel** (California Dept. of Fish and Game [CDFG]) conducted a second year

of at-sea Marbled Murrelet surveys off central California, funded by the T/V Command Trustee Council. Based on these surveys, the local (genetically distinct) population has apparently declined from an estimated 600-700 in the early 2000s to 367 in 2007 and 174 in 2008. For the first year, no juveniles were detected during at-sea surveys.

## CASPIAN TERNS

Research on colony status and diet composition of Caspian Terns (*Hydroprogne caspia*) was restarted at colonies in the San Francisco Bay area of California during 2008. Additionally, we initiated a radio telemetry study to assess foraging ecology of Caspian Terns nesting on Brooks Island, the largest tern colony in the Bay area.

Four breeding colonies of Caspian Terns were known in the San Francisco Bay area in 2008: Brooks Island, Eden Landing, Stevens Creek and Agua Vista Park. The total nesting population was approximately 1025 pairs, compared to approximately 1010 pairs in 2005. As in previous years, the majority of pairs nested at the Brooks Island colony (approximately 79% in 2008). Marine forage fishes, in particular anchovies (*Engraulidae*), surfperch (*Embiotocidae*), and clupeids (e.g. herring and sardines), were the predominant prey for Brooks Island terns in 2008; juvenile salmonids made up approximately 10% of their diet. Brooks Island is well north of the Bay Bridge. Diet composition at Eden Landing was different, with silversides (*Atherinidae*) and surfperch being the most common prey, while juvenile salmonids made up less than 1% of the diet at this colony, located well south of the Bay Bridge.

Forty-two adult Caspian Terns were captured and radio-tagged on Brooks Island during late incubation in 2008. Of these, 20 individuals were confirmed to be nesting on Brooks Island, one nested at Eden Landing, and two left the Bay Area. The most commonly used foraging areas were the west side of San Francisco Bay near the Golden Gate Bridge, the nearshore area outside of the Bay, and



the eastern side of San Pablo Bay up to the mouth of the Carquinez Strait.

Participants in the study included Oregon State University (OSU), Real Time Research (RTR), and the U.S. Geological Survey—Oregon Cooperative Fish and Wildlife Research Unit (USGS). This year's team included **Dan Roby** (OSU/USGS), **Lindsay Adrean**, **Dan Battaglia**, **Don Lyons**, **Tim Marcella**, **Kim Nelson**, and **Yasuko Suzuki** (OSU), **Ken Collis** and **Allen Evans** (RTR), and a number of seasonal technicians and volunteers. The study was funded by the U.S. Army Corps of Engineers, with logistic support and technical assistance from the East Bay Regional Parks, USFWS, Don Edwards National Wildlife Refuge, CDFG, and the San Francisco Bay Bird Observatory.

#### OTHER SURVEYS AND MONITORING

Under **Breck Tyler** (Principal Investigator), aerial surveys were continued in 2008 for marine birds and mammals in California continental shelf waters, under contract with OSPR. Other participants were **Jeff Davis**, **Phil Capitolo**, **Brad Keitt**, **Tonya Haff**, **Dave Lewis**, and **Glenn Ford** (University of California, Santa Cruz [UCSC]); **Laird Henkel** was in charge at OSPR. The surveys are designed to collect baseline distribution and abundance data and to maintain rapid-response capabilities for oil spills. During the past year, the surveys focused on waters from Sonoma County to Monterey County. In late 2007, the team responded to the *Cosco Busan* oil spill in San Francisco Bay, providing OSPR with real-time distribution and abundance data for affected areas. **Ryan DiGaudio** has joined the survey team, replacing **Tonya Haff** who is pursuing a PhD in Australia.

**Phil Capitolo** (UCSC), in cooperation with **Gerry McChesney** (USFWS), conducted aerial photographic surveys of Common Murre (*Uria aalge*), Brandt's Cormorant (*Phalacrocorax penicillatus*), and Double-crested Cormorant (*P. auritus*) breeding colonies from the Oregon border to Point Conception, under contract with OSPR (**Laird Henkel**; also

see Southern California regional report). **Zach Coffman** and **Peter Kappes** (USFWS), **Deasy Lontoh** (Humboldt State University [HSU]), and **Travis Poitras** (UCSC) assisted. **Breck Tyler** was Principal Investigator.

**Mark Rauzon** (Marine Endeavors), **Meredith Elliott** (PRBO Conservation Science [PRBO]), **Eric Lichtwardt** (LSA and Associates), and **Jason Minton** (Garcia and Associates) cooperated in a one-day boat survey of Double-crested Cormorants (*Phalacrocorax auritus*) on 2 San Francisco Bay bridges on 30 May 2008: the Richmond-San Rafael Bridge and the San Francisco-Oakland Bay Bridge. We have been conducting one-day surveys (usually in mid-May) on these bridges since 2004, to collect basic population data for comparison with our more detailed studies in 1988-1990 and 2000. Results from 2008 indicate approximately a 50% decline in the number of nests from 2007. Reasons for this decline are unknown. Possible causes include the May heat wave, disturbance from construction activities on the San Francisco-Oakland Bay Bridge (unlikely, since construction of the roadway is now complete), and the fact that part of the available habitat on the Richmond-San Rafael Bridge was boarded off for maintenance work.

**Jaime Jahncke** and **Meredith Elliott** (PRBO), **Ben Saenz** (Stanford University), **Lisa Etherington** (Cordell Bank National Marine Sanctuary [NMS]), and **Jan Roletto** (Gulf of the Farallones NMS) completed the fifth year of at-sea work (and their 20th cruise) in the Gulf of the Farallones and Cordell Bank NMSs. They have collected data on seabird and marine mammal abundance and distribution (using line transect survey methods), krill abundance and distribution (using hydroacoustics), zooplankton community (using nets), and physical oceanographic conditions (using continuous underway data and vertical profiles from CTD casts along survey transects). Results to date show that there was reduced and delayed upwelling in 2005 and 2006, which led to a decline in krill (*Euphausia spp.*) abundance and an increase in gelatinous

zooplankton from 2004 levels. Krill declines resulted in complete breeding failure of Cassin's Auklets (*Ptychoramphus aleuticus*) in 2005 and 2006. Stronger, earlier upwelling conditions occurred in 2007 and 2008; as a result, krill abundance increased, and adult krill (the main diet item of Cassin's Auklets) were also more abundant during these years. We are doing spatial analysis to understand what drives the abundance and distribution of birds and mammals and their prey. We are working closely with the National Marine Sanctuaries program to coordinate efforts and increase sampling coverage.

**Susan Euing** (USFWS) and **Meredith Elliott** (PRBO) worked at the California Least Tern (*Sternula antillarum browni*) colony at Alameda Point (the former Alameda Naval Air Station). The 2008 breeding season had one of the best reproductive years since the beginning of monitoring in 1976. There were an estimated 323 breeding pairs and 336 nests. Of the 633 eggs laid, 543 hatched, for a hatching success of 86%. An estimated 432 fledglings were produced, and breeding success was 1.3 fledglings per pair. Few eggs were abandoned or failed to hatch. While predation was higher than normal on adults and fledglings, predation rates on eggs and chicks were lower than in other years.

Point Reyes National Seashore (PRNS) staff are working with USFWS to monitor Common Murres and other seabirds as part of a Natural Resource Damage Assessment restoration program. PRNS also responded to the *Cosco Busan* oil spill in December 2007, which left oiled seabirds at Point Reyes, including Marbled Murrelets. In collaboration with PRBO, PRNS monitored western Snowy Plovers (*Charadrius alexandrinus*) as part of a long-term monitoring and management program. Plovers had poor productivity in 2008 because of intense wind, high tides, and predation. Only 21 nests were counted, compared to 28 last year, and only 52% were successful. Of the 30 chicks hatched, only 5 fledged. PRNS's educational docents contacted hundreds of visitors on



weekends during the breeding season to reduce disturbance of plovers. Monitoring and management will continue in 2009, including a restoration project on 121 hectares of coastal dunes, in which non-native beach grass that has severely reduced plover habitat will be removed. Plovers were documented using restored habitat for nesting and brooding young immediately after previous dune restoration projects.

The Common Murre Restoration Project is conducted cooperatively by the USFWS (San Francisco Bay National Wildlife Refuge Complex; **Gerry McChesney**, **Peter Kappes**), HSU (**Rick Golightly**, **Deasy Lontoh**, **Sandy Rhoades**, **Lisa Eigner**, **Phil Capitolo**, **Kim Borg**, **Erica Donnelly**), National Audubon Society (**Steve Kress**), and Carter Biological Consulting (**Harry Carter**), with additional assistance from PRNS. In 2008, we continued studies of disturbance at Common Murre colonies in central California with funds from the Command Trustee Council. We also monitored the status of the restored Devil's Slide Rock colony and population trends of other California seabirds (in cooperation with UCSC and CDFG), funded by the Apex Houston and Command Trustee Councils. Capitolo and McChesney also completed surveys of sample Western and California Gull (*Larus occidentalis* and *L. californicus*) colonies in northern and central California, with funding from USFWS.

#### OTHER PROJECTS

**Jennifer Martin** (PRBO) is initiating the California Current Joint Venture (CCJV). This program will provide a critical link between scientific research and resource management to achieve conservation goals in the California Current Large Marine Ecosystem. A key goal is the development and utilization of ecosystem-based management tools and policies. In our pilot project for the CCJV we are examining options for advancing ecosystem-based management of forage species. These mid-trophic-level prey occupy a critical role in the food web as essential resources for top

predators—marine birds, mammals, and other fish such as salmon and tuna, some of which are endangered or commercially valuable. To improve protection of these species and the integrity of marine ecosystems, federal and state managers need to adopt innovative scientific methods and an ecosystem-based approach. However, there are complex scientific and management issues surrounding ecosystem-based forage fish management. Improvements will require collaboration among scientists and community leaders with forage fish and ecosystem expertise, knowledge of state and federal management policies, and an understanding of harvest practices and fishery economics. PRBO is working with a diverse group of stakeholders to prepare the West Coast Forage Fish Action Plan, which will describe challenges and make recommendations for the ecosystem-based management of forage species. The Action Plan is due to be completed in December, 2008. For more information, please contact Jennifer Martin at [jmartin@prbo.org](mailto:jmartin@prbo.org).

**Michelle Kappes** is continuing her PhD thesis research with **Daniel P. Costa** and **Scott A. Shaffer** at the UCSC on the foraging ecology and energetics of Laysan (*Phoebastria immutabilis*) and Black-footed Albatrosses (*P. nigripes*) at Tern Island, Northwestern Hawaiian Islands, and Indian Yellow-nosed Albatrosses (*Thalassarche carteri*) at Amsterdam Island, Southern Indian Ocean (see Hawaii and Pacific Rim regional report).

A goal of Oikonos-Ecosystem Knowledge is to collaborate with educators to develop innovative programs that disseminate our research results to a broad, diverse community. Our ocean stewardship activities, coordinated and implemented by **Carol Keiper**, have been used by over 1,400 students in the east San Francisco Bay area since 2006. We have been using the Black-footed albatross as "Winged Ambassadors for a Clean Ocean," to link science with public stewardship for marine conservation. The pilot program Plastics in the Ocean is now fully funded by the City of

Benicia, California to teach all 6th grade students about the critical need to prevent plastic pollution. In 2008 we initiated a pilot program to expand Plastics in the Ocean to 7th and 8th grades and to high school oceanography classes. The program uses Oikonos's albatross research to teach science skills and ocean stewardship. All activities are available on the Oikonos website, <http://www.oikonos.org/projects/oceanstewardship.htm>. New on the site is the "Campus Trash Survey Activity," a project for making a difference locally by monitoring trash and documenting improvements. Other new features on the site are student art and essays and teacher comments about the program.

**Scott Shaffer**, **Bill Henry**, and **Don Croll** of UCSC) and the Tagging of Pacific Predators program (TOPP) program continue to track albatrosses at French Frigate Shoals, Midway Atoll National Wildlife Refuge, and Guadalupe Island, Mexico, using satellite, GPS, and archival geolocation loggers. **Hillary Young** (Stanford University) and Shaffer continue studying the foraging ecology of boobies at Palmyra. (See regional reports for Hawaii and Pacific Rim and Southern California and Mexico for details.)

**David Ainley** (HT Harvey Associates/Penguin Science) worked with **Josh Adams** and others using satellite transmitters to investigating the foraging range of Hawaiian Petrels (*Pterodroma sandwichensis*) nesting at Haleakala National Park (see Hawaii and Pacific Rim regional report).

**Ainley** and **David Hyrenbach** (Hawaii Pacific University) have been investigating population trends of central California seabirds, by analyzing a 20-year data set collected in conjunction with Rockfish Assessment cruises of the National Marine Fisheries Service (NMFS), Southwest Fisheries Science Center. Funding has been provided by California Department of Fish & Game.

**Ainley** has also been synthesizing marine bird and prey abundance data for area from Newport, Oregon to

Crescent City, California, working with **Katie Dugger** and **Dough Reese** (OSU), **Cyndy Tynan** (Research Scientists of Woods Hole), **Ric Brodeur** (NMFS, Newport), and **Glenn Ford** (RG Ford Consulting). This work is being funded by the National Science Foundation as part of the U.S. Northeast Pacific Global Oceans Ecosystems Dynamics Program (NEP-GLOBEC).

## SOUTHERN CALIFORNIA

Compiled by **Dan Robinette**

**Laurie Harvey** (National Park Service) continues to oversee seabird projects in Channel Islands National Park, under the Montrose Settlement Restoration Program. Four seabird habitat restoration projects were continued in 2008. Reproductive effort, success, and phenology of Cassin's Auklets (*Ptychoramphus aleuticus*) were monitored on Scorpion Rock (Santa Cruz Island) as well as at a reference site at Prince Island (San Miguel Island, in collaboration with U.S. Geological Survey). A pilot project on revegetation and soil stabilization at Scorpion Rock was completed in fall 2008; the plant work was carried out in cooperation with Growing Solutions. Reproductive effort, success, and phenology of Ashy Storm-Petrels (*Oceanodroma homochroa*) were monitored on Orizaba Rock and in 4 Santa Cruz Island sea caves by **Harry Carter** (Carter Biological Consulting), **Bill McIver** (U.S. Fish and Wildlife Service [USFWS]), and Harvey. Baseline data for colony sizes, reproductive success, and timing of breeding were gathered for comparison to baseline data since 1995. The Cavern Point Cove Caves colony was decimated by island spotted skunks (*Spilogale gracilis amphiala*) which killed at least 30 adults. Social attraction techniques (21 artificial nest sites and a vocalization broadcast system) were first deployed at Orizaba Rock, and Ashy Storm-Petrels laid eggs in association with four artificial sites. Ten

Ashy Storm-Petrel eggs were collected for contaminants analysis.

Harvey monitored reproductive effort, success, and phenology of Xantus's Murrelets (*Synthliboramphus hypoleucus*) at Santa Barbara Island (SBI). Plant habitat restoration on SBI was expanded to four sites. Social attraction for Cassin's Auklets will commence there in 2009.

**Dan Robinette** and **Julie Howar** (PRBO Conservation Science) have completed their 10th year of seabird data collection. Environmental conditions in 2008 were similar to Southeast Farallon Islands and the central California coast, with cool water temperatures and heavy winds in spring extending into the summer. Nearshore pelagic conditions were conducive to foraging flock formation, implying high productivity and prey availability. Seabird productivity was variable, although variation was not extreme compared to past years. Pelagic feeding seabirds seemed to fare the best this year, followed by demersal feeders. Those dependent on the rocky intertidal zone were less successful than in previous years. The California Least Tern (*Sternula antillarum browni*) population continues to be low compared with previous years, but fledging success was 2nd highest on record. Brandt's and Pelagic Cormorant (*Phalacrocorax penicillatus* and *P. pelagicus*) populations were slightly smaller. Brandt's Cormorants initiated breeding later than in previous years. Productivity was not affected by the late start and was "average" to "better than average." Western Gulls (*Larus occidentalis*) started off strongly. There were more nests off-colony than in previous years but the majority of those nests did not fledge chicks. Birds on the colony had high productivity, similar to previous years. Black Oystercatchers (*Haematopus bachmani*) did not put forth a strong reproductive effort this year; the number of territories occupied was similar to previous years, but not all had breeding activity and few were successful.

**Kathy Keane** (Keane Biological Consulting [KBC]) continued monitoring the California Least Tern nesting population in the Los Angeles Harbor,

with several assistants. Least Terns initiated 529 nests in 2008, a 25% decrease from 2007 numbers. This decrease may be due to more suitable nesting conditions at nearby sites, frequent visits by a Peregrine Falcon (*Falco peregrinus*), and unsuccessful vegetation management in 2008. In addition to Least Terns, approximately 3300 Elegant Terns (*Sterna elegans*), 270 Caspian Terns (*S. caspia*) and three to 20 Royal Terns (*S. maxima*) nested successfully in Los Angeles Harbor in 2008. KBC also monitored the third year of a restoration project in Upper Newport Bay, Orange County, to ensure that dredging and other activities are avoiding the Least Tern nesting area and other endangered birds. KBC also is finishing compilation of a database for the USFWS Portland office for all tern and skimmer species in California.

**Mike Horn** (California State University, Fullerton) continued his long-term project to assemble manuscripts on the food and foraging of nesting terns and skimmers in southern California. He will submit them to *Studies in Avian Biology*. **Jeanette Hendricks**, a graduate student working with Horn, studied the foraging locations and diet of nesting Elegant Terns at the restored and expanded Bolsa Chica Ecological Reserve on the coast of Orange County in 2007 and 2008. Her goal is to determine whether adult terns will forage in the newly created full tidal basin adjacent to the nesting areas, or will continue to feed mainly in the ocean as they did before restoration. Results from the two seasons indicate mostly ocean foraging by this tern. As has occurred in seabird diets in the North Atlantic, pipefish (Syngnathinae) have increased markedly in the diet of Elegant Terns at Bolsa Chica. We are planning studies for the 2009 nesting season to attempt to assess the impact of pipefish on chick growth and reproductive success in this Elegant Tern colony.

**Phil Capitolo** and **Jeff Davis** (University of California, Santa Cruz [UCSC]; **Breck Tyler**, Principal Investigator) conducted aerial photographic surveys of Brandt's Cormorant and Double-crested Cormorant (*Phalacrocorax auritus*) at



breeding colonies south of Point Conception under contract with the California Department of Fish and Game—Office of Spill Prevention and Response (**Laird Henkel**). The goal of surveys is to document the current locations of breeding colonies, and archived digital images can be used to determine breeding population sizes and trends. **Dani Lipski** (Channel Islands National Marine Sanctuary) assisted.

The Tagging of Pacific Predators program (TOPP; UCSC) continues to deploy archival tags on Laysan Albatrosses at Guadalupe Island, in coordination with work at several colonies throughout the North Pacific. PhD student **Bill Henry** has been involved in the research on Guadalupe, as well as monitoring for breeding success and changes in diet. See also the report for Hawai'i and the Pacific Rim.

**Lisa T. Ballance** and **Robert L. Pitman** continue to conduct seabird surveys as a regular part of the marine mammal and ecosystem assessment cruises, under the National Oceanic and Atmospheric Administration (NOAA)—Southwest Fisheries Science Center and NOAA—Fisheries. Two areas are monitored regularly. One is the California Current (US–Mexico border to US–Canada border and seaward to 300 nautical miles offshore); it is surveyed every three years during Jun–Nov, using 120 sea days aboard one NOAA research vessel. This survey ended on 1 Dec 2008. The project involves collaboration with a number of National Marine Sanctuaries along the west coast, within which we conduct marine mammal and ecosystem assessment during some years at a fine spatial resolution. The seabird highlight of 2008 was a confirmed sighting of a Wandering Albatross (*Diomedea exulans*). Details of this cruise, including regular reports from the field, are posted at <http://swfsc.noaa.gov/prd-orcawale.aspx>. The second monitoring area, the eastern tropical Pacific (waters between the US–Mexico border, Hawaii, and Peru), is surveyed approximately every three years during Aug–Nov, using 240 sea days aboard two NOAA research vessels. The most recent

survey was conducted in 2006; the next survey is planned for 2010. Details can be found at <http://swfsc.noaa.gov/prd-star.aspx>

**Nina Karnovsky** (Pomona College) and two undergraduates, **Julia Gleichman** and **Derek Young** and one alumna, **Laurel McFadden**, studied the foraging behavior of Dovekies (*Alle alle*) in Hornsund Fjord, Spitsbergen (see North Atlantic regional report).

In retirement, **Charlie Collins** continues his field studies of California Least Terns breeding at Seal Beach Naval Weapons Station and survival of Black Skimmers (*Rhynchops niger*) in Southern California. He is also working up a variety of accumulated data for publication (not all of it on seabirds).

## NON-PACIFIC UNITED STATES

Compiled by **Melanie Steinkamp**

Research continued on seabird ecology in South Carolina, under the guidance of **Patrick Jodice** (U.S. Geological Survey—South Carolina Cooperative Research Unit, and Clemson University [CU]) **Lisa Ferguson Eggert** (CU) continued her PhD research focusing on reproductive and physiological ecology of seabirds at protected colonies. **Lisa Wickliffe** (CU) completed her MS degree examining the relationship between seabird foraging activities and commercial shrimp trawling activity in South Carolina. Along with **Will Mackin** (University of North Carolina) and **Jennifer Arnold** (Pennsylvania State University), Jodice deployed geolocators on 11 Audubon's Shearwaters (*Puffinus lherminieri*) and 13 White-tailed Tropicbirds (*Phaethon lepturus*) breeding in the Bahamas. Funding was from the Avian Influenza Surveillance Monitoring Program of the U.S. Fish and Wildlife Service (USFWS) (yep, we swabbed birds too!). Two devices were retrieved after 5 weeks, and we will attempt to re-

cover the remaining devices in spring and summer 2009. Our lab also assisted the South Carolina Department of Natural Resources in organizing the first Southeastern Seabird Working Group meeting, which focused on colony surveys and colony management issues throughout the region.

**Jeff Spendelow** (U.S. Geological Survey—Patuxent Wildlife Research Center) continues to oversee a long-term cooperative research project on the metapopulation dynamics and ecology of endangered Roseate Terns (*Sterna dougallii*; ROST) in the Massachusetts–Connecticut–New York region. Two manuscripts by Spendelow et al. will be published in *Waterbirds* in 2008: on temporal variation in adult survival rates based on an analysis of 19 years of capture-recapture data at 5 colony sites, and on the breeding dispersal of 6 adults from Buzzards Bay, Massachusetts (BBMA) to two colony sites in Maine. Jeff conducted his 2008 breeding season fieldwork in BBMA, in collaboration with **Carolyn Mostello** (Massachusetts Division of Fisheries & Wildlife) and her staff. Nine hundred thirty-five adult ROSTs were trapped. Old color bands were recorded and fixed as needed, and 666 new combinations were put on; we think that more than half of breeding adult ROSTs in the colony are now color-banded. During the post-breeding dispersal period, Jeff worked with collaborators to resight and identify banded ROSTs all around the greater “Cape Cod and Islands” area. Cooperators included **Becky Harris** (Director), **Ellen Jedrey** (Assistant Director), and other staff of Massachusetts Audubon's Coastal Waterbird Program, **Edie Ray** (Nantucket Conservation Foundation), **Katie Blake** (graduate student at Antioch University), long-time colleague **Ian Nisbet**, and others. During a 5-week period that started on 2 August, Jeff himself identified 1080 color-banded individuals, which are more than half the estimated 2030 ROSTs that have been color-banded on BBMA and are thought still to be alive. (Color-banding was resumed in BBMA in 2004.) Resighting data from mid July



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through September 2008 are still being summarized, but we expect that we obtained nearly 15,000 identifiable sightings from at least 10 locations.

A study has been initiated to evaluate foraging ecology and nest site attendance of Atlantic Puffins (*Fratercula arctica*) on Petit Manan Island, Maine. The project is being conducted by NWR biologist **Linda Welch** of the Maine Coastal Islands National Wildlife Refuge (MCINWR), **Paul Sievert** of U.S. Geological Survey–Massachusetts Cooperative Fish and Wildlife Research Unit (MCFWRU) and graduate student **Sarah Spencer**. The goal of the project is to understand characteristics of foraging flights and dives of puffins, and to learn how nest site attendance and provisioning affect productivity. The project overlaps with research being conducted for an Atlantic Puffin Metapopulation Study. Researchers placed digital cameras at puffin burrows to determine status of burrows and monitor nesting activity. We also placed infrared video cameras at 14 burrows to evaluate nest site attendance and provisioning rates. We took morphological measurements, a small blood sample for DNA analysis, and banded each bird with a metal and a field-readable band. Temperature depth recorders (TDRs) were attached to the puffins' bands, to allow us to monitor dive depth and duration, number of dives in a foraging trip, time spent traveling between the breeding colony and foraging habitat, and time allocation of the birds throughout the day. We attempted to re-trap birds for TDR removal and to measure mass four to five days after TDR deployment.

The MCFWRU, National Audubon Society (NAS), and MCINWR initiated a study to evaluate foraging behavior and nest site attendance of Razorbills (*Alca torda*) on Matinicus Rock, Maine. The project is being conducted by **Paul Sievert**, graduate student **Katherine Kauffman**, NAS biologist **Scott Hall**, and **Linda Welch**. The goal is to understand characteristics of foraging flights and dives of Razorbills, and to document site attendance and provisioning rates.

Temperature depth recorders (TDRs) were attached to the razorbills' bands, to obtain dive and time-budget data as in the puffin study (previous paragraph). Results will be compared to similar studies carried out in the central latitudes of the Razorbill's breeding range.

The 2008 field season represented the 25<sup>th</sup> year of seabird restoration efforts at MCINWR. In cooperation with our partners in the Gulf of Maine Seabird Working Group, the refuge has been managing six islands along the coast of Maine in an effort to restore populations of Roseate Tern, Arctic Tern (*Sterna paradisaea*), Common Tern (*Sterna hirundo*), Atlantic Puffin, and Razorbills. Many of these birds had been eliminated from coastal islands in recent decades, due to rapidly increasing populations of Great Black-backed Gulls (*Larus marinus*) and Herring Gulls (*Larus argentatus*). The refuge has used pyrotechnics, harassment, shooting, dogs, egg and nest destruction, and the avicide DRC 1339 to make the islands safe for nesting terns. Once the islands are "gull free," the refuge has used social attraction techniques to lure the birds back to their historic nesting islands. Decoys of puffins, razorbills, and terns, combined with recordings of an active seabird colony, were used to entice the birds to nest. These methods have been highly successful, and the seabirds have made significant progress towards recovery objectives. Within the State of Maine, all the Roseate Terns, Atlantic Puffins, and Laughing Gulls (*Larus atricilla*) nest on 10 islands managed by the Refuge, National Audubon Society, and Maine Department of Inland Fisheries and Wildlife. These 10 islands also support over 90% of Common and Arctic Terns in Maine. Within the United States, 98% of Atlantic Puffins and 75% of the Razorbills nest on 4 islands owned and managed by the MCINWR. The refuge also supports over 97% of Arctic Terns nesting in the lower 48 states.

**Carsten Egevang** (Greenland Institute of Natural Resources) and **Iain Stenhouse** (National Audubon Society) retrieved some of 50 archival geo-loc-

ator loggers that they deployed on Arctic Terns and Sabine's Gulls (*Xema sabini*) breeding in Northeast Greenland in 2007 (see report for the North Atlantic).

**Robin M. Overstreet** and post-doctoral fellows **Stephen Bullard** and **Hongwei Ma** (Gulf Coast Research Laboratory, The University of Southern Mississippi, Ocean Springs, [USM]) continued to work on helminths of birds as well as on other host groups, with an emphasis on trematodes and nematodes. During the last year, three papers were published on parasites of crabs and fish, some of which mature in birds. Three more manuscripts are in press concerning parasites that mature in birds. Additional new research is presently underway at USM on bird parasites with larval stages in fishes, with student **Eric Pulis** and colleagues **Richard Heard** (USM), **Andrew Mitchell** (U.S. Department of Agriculture, Stuttgart, Arkansas) and **Vasyl Tkach** (University of North Dakota). A variety of parasites that infect birds in Summer Lake, Oregon are being collected, in conjunction with **Marty St. Louis** and others of the Summer Lake Wildlife Area, Oregon Department of Fish and Wildlife.

**Don Dearborn** and collaborator **Mark Haussmann** (both of Bucknell University) and **Bob Mauck** (Kenyon College) to study nestling growth and parental care in Leach's storm-petrels (*Oceanodroma leucorhoa*) in Canada's Bay of Fundy (see Canada regional report). **Dearborn** and **Frans Juola** (University of Miami) are using Great Frigatebirds (*Fregata minor*) to test for a link between inbreeding and reduced immune function (see Hawaii and Pacific Rim regional report).

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## HAWAI'I AND PACIFIC RIM

Compiled by **Linda Elliott**

### MAIN HAWAIIAN ISLANDS

The Hawai'i Division of Forestry and Wildlife and the U.S. Fish and Wildlife Service (USFWS) are in the midst of a joint planning effort

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to improve coordinated, statewide conservation of Hawai'i's Federally listed and candidate seabirds. These include the endangered Hawaiian Petrel or 'ua'u (*Pterodroma sandwichensis*), threatened Newell's Shearwater or 'a'o (*Puffinus auricularis newelli*), and candidate Band-rumped Storm-Petrel or 'ake'ake (*Oceanodroma castro*). Contact **Holly Freifeld** (USFWS) or **Nick Holmes** (Kauai Endangered Seabird Recovery Project) for more information.

**Lindsay Young** will finish her PhD at the University of Hawai'i (UH) in May 2009, on the population genetics and foraging ecology of Laysan Albatross (*Phoebastria immutabilis*). Her dissertation has produced several surprising results, most notably the high rates of female-female pairing in this species, and now in Black-footed Albatross (*Phoebastria nigripes*). Lindsay plans to continue doing seabird research in Hawai'i after graduation; she recently received funding to track Wedge-tailed Shearwaters, Red-tailed Tropicbirds (*Phaethon rubricauda*), and Red-footed and Brown Boobies (*Sula sula* and *S. leucogaster*) on Lehua Islet off of Kauai. Her co-principal investigators will be **David Hyrenbach**, **Scott Shaffer** and **Rob Suryan**.

Young also deployed archival loggers on juvenile Laysan Albatrosses at Kaeana Point, Oahu, as part of a larger collaboration with **Rob Suryan** (Oregon State University) and **Marc Romano** and **Maura Naughton** (USFWS), and the Tagging of Pacific Predators Project (TOPP) to examine the breeding and post-breeding movements of North Pacific albatrosses at several colonies throughout the North Pacific. Archival loggers have been deployed on adults at Tern and Guadalupe Islands, Midway Atoll National Wildlife Refuge (NWR), and Kaeana Point all during the same breeding season (see also Northwestern Archipelago, below, and the regional report for Southern California and Mexico).

Young is project coordinator for the Kaena Point Ecosystem Restoration

Project on Oahu, which will be constructing a predator-proof fence in early 2009 to protect Laysan Albatross, Wedge-tailed Shearwaters (*Puffinus pacificus*) and 11 endangered plant species from predators. Eradication of predators from within the reserve is scheduled to occur shortly afterwards.

**Cathleen Bailey** reports that Haleakala National Park (HNP) continues to monitor endangered 'ua'u (Hawaiian Petrel) populations in the upper elevations of Haleakala on Maui. There are currently more than 1000 known nesting burrows, and there may be several hundred more burrows in backcountry areas that have yet to be documented. The population shows remarkable recovery since first being documented in the 1960s. This is attributed to improvement of 'ua'u nesting habitat. The National Park Service (NPS) removes and controls feral ungulates and introduced predators. New protocols for monitoring the 'ua'u are being developed to gain more details on its population at HNP. Even with intensive predator control, predation on 'ua'u still occurs. A motion-sensitive camera set at the entrance of an 'ua'u burrow documented a feral cat (*Felis catus*) entering and exiting a burrow. The cat had 'ua'u feathers in its mouth. However, the next frame showed an 'ua'u exiting the same burrow. Our speculation is that the cat got only feathers of the 'ua'u, not the actual bird. In response to this documented instance, predator control techniques have been modified and the capture of feral cats has increased.

**Josh Adams** (U.S. Geological Survey [USGS] Western Ecological Research Center) and **David Ainley** (HT Harvey and Associates) led a collaborative project to track movements of breeding Hawaiian Petrels on the islands of Maui and Lana'i via satellite telemetry. This was their third and final year of telemetry. They discovered that petrels nesting in Haleakala travel on long-range foraging loops into the North Pacific. Average trips are 9500 km or more and last approximately 18 days.

Other researchers on the project were **Cathleen Bailey** and **Joy Tomatose** (HNP), **Holly Freifeld** (USFWS), **Greg Spencer** (FirstWind) and **Jay Penniman** and **Fern Duvall** (Hawai'i Department of Lands and Natural Resources, Division of Forestry and Wildlife [DOFAW]). The project has been funded by the USGS Science Support Partnership program and the USFWS Pacific Islands Office, with major assistance from HNP, Hawai'i Division of Forestry and Wildlife, and the Pacific Cooperative Studies Unit (PCSU) of the University of Hawai'i (UH). In 2009, again funded jointly by USFWS and USGS, these partners will initiate a PIT (passive integrated transponder) study of nest-site attendance and concurrent radar studies of Hawaiian Petrels nesting from the largest known colony, atop Haleakala on Maui. The Hawaiian Petrel population is estimated at 20,000, based on at-sea surveys by Larry Spear and cooperators.

**David Duffy** (PCSU) is principal investigator for seabird research and management on the islands of Maui Nui (Maui, Lana'i and Moloka'i), Hawai'i. **Fern Duvall** of DOFAW initiated this effort and continues to help direct it. **Nick Holmes** (PCSU) has participated from the start in program activities and ongoing project design. **Jay Penniman** (PCSU) manages the program from Maui. The question, "Are there Hawaiian Petrels and or Newell's Shearwaters breeding on the island of Lana'i?" was first addressed in spring of 2006. Subsequent surveys have confirmed a significant breeding population of Hawaiian Petrels. Although no definitive numbers have been estimated, listening surveys and observations with night-vision and thermal-imagery equipment have indicated that several thousand Hawaiian Petrels are attending the Lana'i colony. A few Newell's Shearwaters have also been heard during nighttime surveys, but no indication of breeding activity has been documented. Management to benefit Hawaiian Petrel includes control of predators (cats and Barn



Owls [*Tyto alba*]), fence line visibility enhancement, and habitat restoration (primarily removal and suppression of *Psidium cattianum*). Habitat restoration and a portion of predator control are partially funded by Castle and Cooke, LLC. This funding serves as mitigation for potential take of endangered species at seven meteorological towers, which were erected to assess the potential for wind farms on Lana'i (their electricity would be exported to Oahu).

Hawaiian Petrel and Newell's Shearwater surveys on the island of Moloka'i were begun this year. Small numbers of Hawaiian Petrels were observed and no Newell's Shearwaters were found. Surveys on Moloka'i will continue in 2009. Wedge-tailed Shearwaters breed on all of the islands of Maui Nui. **Fern Duvall** initiated a banding program for this species (and Hawaiian Petrels) in 1996. This effort has now expanded from Maui (5 colonies) to Moloka'i (1 colony), Lana'i (1 colony), the islet Molokini (1 colony), and the islet Alau (1 colony). First recaptures were collected this year on Maui; all had been banded on Molokini. Efforts to map all of the Wedge-tailed Shearwater colonies of Maui Nui continue.

Research is exploring several aspects of Hawaiian Petrel biology: genetics (**Helen James**, funded by NSF, and **Robert Fleischer** of the Smithsonian Institution); stable isotope analysis (**Peggy Ostrom**, Michigan State University); breeding phenology (PCSU); and activity and movement patterns during the chick-provisioning period by satellite tagging (**Josh Adams** [USGS] and **David Ainley** [H.T. Harvey and Associates]), and **Holly Freifeld** [USFWS]).

Other species known to breed on the islands of Maui Nu include Band-rumped Storm-Petrel, Bulwer's Petrel (*Bulweria bulwerii*), Red-tailed Tropicbird, White-tailed tropicbird (*Phaethon lepturus dorotheae*), Masked Booby (*Sula dactylatra personata*), Brown Booby (*Sula leucogaster plotus*), and Black Noddy (*Anous*

*minutus melanogenys*). The Maui Nui Seabird Program has the long-range objectives of locating, mapping, protecting and expanding the colonies and nesting areas of these species. Project staff are members of the newly formed Kaho'olawe Faunal Restoration Working Group. The group will review plans for research and management on the island, such as seabird surveys, predator control and potential reintroductions, and will participate in activities there, as permitted by time, funding and Kaho'olawe Island Reserve Commission agreement.

**Bob Day** and **Brian Cooper** of ABR conducted research on movement patterns of Hawaiian Petrels and Newell's Shearwaters on Oahu Island. Along with **Jon Plissner** (ABR), they also continued research on movement patterns of Hawaiian Petrels and Newell's Shearwaters on Lanai Island.

The Maui Nui Seabird Program takes primary responsibility on Maui for retrieval, rehabilitation, banding and release of seabirds that are "downed" during fledging by light attraction and human infrastructure. They also handle seabirds downed on ocean-going vessels, primarily cruise ships. Project staff continue to help with an on-line database for downed birds being developed by **George Phocas** (USFWS). Program staff are trained and certified by The Clean Island Council for oil spill response.

In the fall of 2007, the Hawaii Audubon Society (HAS) received the gift of an acre (0.4 hectare) of ocean-front property at Black Point, on the south shore of Oahu, for the purpose of establishing the Freeman Seabird Preserve (FSP) for the protection of native birds, plants and habitat. The site supports a thriving colony of Wedge-tailed Shearwaters. They have been nesting on the FSP and on several surrounding properties of neighbors for decades, under shrubs and in shallow burrows and rock crevices. Anecdotal observations are inconsistent and unreliable for estimating population fluctuations. Since the site was a vacant

residential lot for several years, it is in need of clean-up and alien plant removal, predator control, and nesting habitat enhancement. From mid-December 2007 through March 2008, while the birds were at sea, HAS volunteers met regularly at FSP to remove trash and invasive grasses, vines and shrubs. Predator control was confined in 2008 to placement of ten bait stations for rats (containing Diphacinone) on the property. Initially the bait was heavily consumed and needed replenishment weekly, but by May 2008, biweekly bait checks were adequate. No evidence of mammal predation has been noted in the Wedge-tailed Shearwater population at FSP in 2008. Several unhatched eggs were found during a population survey conducted in the afternoon of 6 September 2008. Forty-seven downy chicks were counted in active nesting sites and about 200 past or potential nesting sites (containing guano and/or feathers) were identified on the preserve. Plans for 2009 include further cleanup, landscaping, and planting of native shrubs and grasses to provide additional breeding and nesting habitat.

**Linda Elliott** of the Hawai'i Wildlife Center (HWC) is providing consultation, protocol development, and staff training for the Save our Shearwater program on Kauai. This program responds to the annual rescue of seabirds "downed" due to light pollution, including the Newell's Shearwater and Hawaiian Petrel. HWC also remains active in the Hawai'i Area Committee for oiled wildlife response and participated in subcommittees on volunteers and inter-island transport of oiled seabirds for rehabilitation. Linda responded to an avian botulism outbreak on Midway (see "Northwestern Archipelago" in this report). HWC began site work in 2008 for the first conservation and emergency response center for the Hawaiian archipelago's native seabirds, waterbirds, birds of prey and forest birds.

#### NORTHWESTERN HAWAIIAN ARCHIPELAGO

**Michelle Kappes** is continuing her PhD thesis research with **Daniel P. Costa**



and **Scott A. Shaffer** at the University of California Santa Cruz (UCSC) on the foraging ecology and energetics of Laysan and Black-footed Albatrosses at Tern Island, and Indian Yellow-nosed Albatrosses (*Thalassarche carteri*) at Amsterdam Island, Southern Indian Ocean. As part of TOPP (<http://topp.org>), she has investigated foraging behavior and marine habitat use by Hawaiian albatrosses, and found that despite inter-annual differences in foraging distribution, sea surface temperature was consistently the most important environmental variable in predicting search effort of albatrosses of both species.

TOPP continues to track albatrosses at French Frigate Shoals (FFS) and Midway Atoll NWR. The work at FFS is our seventh season of tracking both Laysan and Black-footed Albatrosses using satellite, GPS, and archival geolocation loggers. We have been tracking fledgling albatrosses of both species at Midway Atoll NWR since 2006. Last season, archival geolocation loggers were also deployed on breeding adults at Midway. The TOPP team working on this project are doctoral students **Michelle Kappes** and **Melinda Conners**, and faculty members **Scott Shaffer**, **Yann Tremblay**, and **Daniel Costa** of UCSC. This work is an ongoing collaboration with USFWS biologists, including **John Klavitter**, **Marc Romano**, and **Maura Naughton**.

**Don Dearborn** (Bucknell University) and **Frans Juola** (University of Miami) are using Great Frigatebirds (*Fregata minor*) to test for a link between inbreeding and reduced immune function. Field work was completed on Tern Island in 2007. Lab work is being conducted to measure nestling immune function and genetic similarity between mates.

**Linda Elliott** (HWC) provided emergency response assistance for the avian botulism outbreak affecting the critically endangered Laysan Duck (*Anas laysanensis*) at Midway Atoll National Wildlife Refuge. The Laysan Ducks had been introduced to Midway

Atoll in 2004 and 2005 in order to establish a second viable population of this very rare duck species. The transplanted population was growing well until the botulism event that started the first week of August. One hundred forty-five ducks were collected dead and 28 ducks were successfully rehabilitated.

#### NON-HAWAIIAN PACIFIC

**Hillary Young** (Stanford University) and **Scott Shaffer** continue studying the foraging ecology of boobies at Palmyra. This includes tracking birds, and collection of diet samples, blood, and feathers to understand the trophic relationships of the Palmyra seabird community.

**Michelle Kappes** is continuing to study Indian Yellow-nosed Albatrosses at Amsterdam Island, Southern Indian Ocean (see Northwestern Hawaii, above).

#### OTHER WORK

**Simon Hoyle** reports that a workshop on modeling of Black-footed Albatross populations was held at UH on 7-9 November, 2007. This workshop follows one in December 2001 on Protected Species Modeling, which was sponsored by the Pelagic Fisheries Research Project (PFRP). That workshop concluded that integrated statistical models of Hawaiian albatross populations are feasible. The PFRP subsequently funded two projects on modeling the Black-footed Albatross. Purposes of the 2007 workshop were to review results of the PFRP-funded projects, compare them with other population assessments, identify problems in model development and application, and suggest future directions.

Workshop participants agreed on several urgent issues. Among these were:

- Research and model development are impeded by data availability and legal constraints; these problems need to be resolved.

- In order to estimate bycatch and understand fishery impacts, information is needed on spatial and temporal overlap between fishing effort and bird distribution. Researchers need better access to tracking results for birds, and they should develop a uniform way of characterizing longline fishing depth.
- Band resighting data should be archived better by government databases and made available to researchers. They also need better access to various collections of research data.
- A critical piece of information for determining the status of the Black-footed Albatross is change in its population size. Additional population parameters should be determined each year.
- Additional data might be collected on colonies without compromising current protocols. Among other suggestions, banding efforts could be optimized among islands and age classes, feathers and eggshells could be archived, and data could be collected for mated pairs on known-age plots.
- Population models should incorporate environmental factors that are believed to mediate breeding success.

Details and conclusions from the workshop are at <http://www.soest.hawaii.edu/PFRP/wiki/tiki-index.php?page=Albatross+Modeling+Workshop>. The full workshop report at <http://www.soest.hawaii.edu/PFRP/wiki/tiki-index.php?page=Workshop+Report>.

## SOUTH AMERICA AND THE ANTARCTIC

Compiled from other reports

**Liliana Ayala** (Peruvian Association for the Conservation of Nature [APECO]) completed her albatross proj-

ect during 2008. We conducted surveys of 18 long-line fisheries vessels from Paita to Salaverry. Seventeen vessels targeted common dolphinfish (*Coryphaena hippurus*), and one targeted blue shark (*Prionace glauca*) and shortfin mako shark (*Isurus oxyrinchus*). During the 18 longline trips, we observed 381,521 hooks deployed in 171 sets; this is the largest observed effort today in Peru. The principal target of the vessels was common dolphinfish, because the shark season was poor in fall 2007. The days monitored per month varied from 6 to 35. Seabird bycatch by longline fishery vessels was assessed in 2006, 2007 and 2008 by direct observation. Seabirds were not reported as bycatch by any observer. However, this study is only 0.5% of the observation effort of all longline fishery efforts in Peru. Collaborators were **Samuel Amoros** (APECO), **Cynthia Cespedes** (National Institute of Natural Resources) and **Shaleyla Kelez** (Duke University). We participated in the Fourth International Albatross and Petrel Congress with a poster: Catch and Bycatch of Albatross and Petrel in Peru. The project was funded by Ruffrod Small Grants, Idea Wild, Duke Marine Center and Oak foundation. The work on bycatch permitted our participation in the Peruvian Report on implementation of the Agreement on the Conservation of Albatrosses and Petrels.

Research on the conservation of the Humboldt Penguin in Huarney, on the central coast of Peru, is being undertaken by **Raul Sanchez-Scaglioni** (APECO) and **L. Ayala**. We reported at least 292 penguins in the study area, with higher numbers along the northern coast of Peru. Furthermore, we interviewed 35 fishermen; 63% said that they had eaten penguins at some time, 70% said that there are fewer penguins than there were years ago, and 86% know that penguins are threatened. In addition, we are looking at ways to gain the attention of authorities to manage or protect the Humboldt Penguin nesting sites. This project is funded by the mining company Antamina.

**L. Ayala** and **R. Sanchez-Scaglioni** also are finishing a series of seabird conservation videos for the general public with direct and simple language. These videos are about conservation projects of the Marine-Coastal Program in APECO, such as "Albatross: Endangered Air and Sea Giant," "Where are the Humboldt Penguins?," and "The Mysterious Peruvian Storm-Petrel."

**R. Sanchez-Scaglioni**, **L. Ayala** and **L. Felipe** developed a project on predation, weather, microclimate and nest site selection in an Antarctic Tern (*Sterna vittata*) colony, King George Island. The objective was to know if Antarctic Terns choose nest sites with similar conditions. We participated in the Latin-American Symposium of Antarctic Research with the poster: Microclimatic conditions in nesting sites of Antarctic Tern and Antarctic Skua (*Catharacta antarctica*), King George Island. Under the conditions of our study, nest sites were not chosen by thermal characteristics of the air, humidity, and soil. This project was funding by the INANPE (Peruvian Antarctic Institute).

**David Ainley** (HT Harvey Assoc./Penguin science), **Chris Ribic** (University of Wisconsin), **Bill Fraser** (Polar Ocean Research Group), **Eric Woehler** (University of Tasmania), **Glenn Ford** (RG Ford Consulting), and **Cyndy Tynan** (Research Scientists of Woods Hole) have summarized almost all the cruise data collected in the Southern Ocean (including the Pacific Sector) since the late 1970s, and are relating seabird patterns to large-scale fronts and water masses. This work has been funded by National Science Foundation as part of U.S. Southern Oceans Global Oceans Ecosystems Dynamics Program.

**David Ainley** and **John Weller** are using private funding to organize a workshop about the Ross Sea, the last pristine high-seas ecosystem on Earth, for the International Marine Conservation Congress, Washington, D.C. (May 2009). In the meantime, we have barraged the Commission for the Conservation of Antarctic Marine Living

Resources (CCAMLR) with a series of white papers detailing the importance of Patagonian toothfish (*Dissostichus eleginoides*; also called Chilean sea bass) to the Ross Sea ecosystem, to the degree that CCAMLR has agreed to pay more attention. Through the Antarctic and Southern Ocean Coalition, a proposal has been submitted to CCAMLR about Marine Protected Area status for the Ross Sea. The issue has been taken up and supported by The Whale and Dolphin Conservation Society, as well as the Marine Conservation Biology Institute, along with other non-government organizations, as a prime area in need of protection.

**Ainley** and associates have begun the 13th season of a demographic study of Adelie Penguins (*Pygoscelis adeliae*) at Ross and Beaufort Island, Ross Sea. Co-principal investigators are **Katie Dugger**, Oregon State University, and **Grant Ballard**, Point Reyes Bird Observatory. The goal is to explain population trajectories in the Ross Sea sector of the Southern Ocean. This work is being funded by the National Science Foundation.

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## NORTH ATLANTIC

Compiled from other reports

**Nina Karnovsky** (Pomona College) and two undergraduate students, **Julia Gleichman** and **Derek Young**, and one alumna, **Laurel McFadden**, studied the foraging behavior of Dovekies (*Alle alle*) in Hornsund Fjord, Spitsbergen. They assessed the oceanographic conditions adjacent to the colony during at-sea surveys aboard the R/V *Oceania*. They made measurements of diets and reproductive success and chick growth at the colony. They determined the lengths of foraging trips through observations of marked birds and with passive integrated transponders (PIT tags), and they placed time-depth recorders on foraging adults

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to examine dovekie diving behavior. They documented their field season in a blog (<http://projects.pomona.edu/arctic/>). This was the fifth year of this study of how Dovekies respond to changing conditions in the Arctic.

**Carsten Egevang** (Greenland Institute of Natural Resources) and **Iain Stenhouse** (National Audubon Society)

retrieved some of the archival geo-locator loggers that they deployed on birds breeding on Sand Island, Northeast Greenland, in 2007. They retrieved 10 of 50 that were deployed on Arctic Terns (*Sterna paradisaea*) and 11 of 30 deployed on Sabine's Gulls (*Xema sabini*). Preliminary data look good.

This study is expected to provide clear documentation of migration routes and stopover/wintering areas for these champions of long-distance, trans-equatorial migration. The field report on this work is online at [http://www.natur.gl/UserFiles/File/feltrapporter/Fieldreport\\_%20Sand-Island\\_2008\\_final.pdf](http://www.natur.gl/UserFiles/File/feltrapporter/Fieldreport_%20Sand-Island_2008_final.pdf).



# INFORMATION FOR CONTRIBUTORS

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*Pacific Seabirds* is a journal of the Pacific Seabird Group. Manuscripts and news items are welcome on any topic relating to Pacific seabirds or to their conservation. Short manuscripts are preferred (about 1,000 to 5,000 words for major submissions). Submit materials to the Editor (except as noted below): Dr. V.M. Mendenhall, 4600 Rabbit Creek Road, Anchorage, Alaska 99516; e-mail fasgadair@attalascom.net. Deadlines are normally 15 April for the spring issue and 15 October for the fall issue.

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## CONTRIBUTIONS

Contributors are invited to submit the following:

- **Articles** on original research (to be peer-reviewed)
- **Reports** on current topics (e.g., research in progress or seabird conservation issues; not peer-reviewed)
- **Forum** (discussion of a current topic)
- **Review articles** (these may cover seabirds worldwide)
- **Conservation News** (*submit to* Craig Harrison, Conservation Chair; e-mail charrison@hunton.com)
- **News items** (short news relating to seabird research, conservation, or the Pacific Seabird Group)
- **Book reviews**
- **Letters** commenting on content of *Pacific Seabirds* or other issues
- **Art work**, such as sketches of seabirds, either accompanying a text or for publication alone

## PEER-REVIEW OF MANUSCRIPTS

Articles and review articles will be submitted to two peer reviewers for technical review. Other submissions may also be sent for review, if the author requests this or at the editor's discretion.

## SUBMISSION OF MANUSCRIPTS

Material may be submitted by e-mail or regular mail or (addresses above). Materials sent by e-mail should be attached to the main message and should be in Word, WordPerfect, or Rich Text Format, except that materials less than 300 words long may be sent in the body of the e-mail. For manuscripts submitted by e-mail, figures must also be sent

as separate files or via regular mail. If a manuscript is submitted by regular mail, include a CD.

## FORMAT OF MANUSCRIPTS

Contributors should consult format used in a recent issue of *Pacific Seabirds*.

### GENERAL FORMAT

Manuscripts should be double-spaced with 1-inch margins. If your paper size is **A4** (European), **the bottom margin must be at least 1¾ inch** (including in electronic files), to ensure that it will print properly on U.S. equipment. Pages should be numbered, except for Tables and Figures.

Give the scientific name (*italicized*) after the first mention of any genus or species. English names of bird species are capitalized (e.g., Fork-tailed Storm-Petrel). Names of mammals, other taxa, and English names of bird groups are lowercase, except for proper names (e.g., blackbirds, shield fern, Steller's sea cow).

If you use an acronym, give the entity's *full* name the first time it is mentioned. Avoid excessive use of acronyms.

Use the 24-hour clock without a colon (e.g., 1830). Give dates as day-month-year. Use metric measures, except when quoting informal statements. For quantities less than 1, use an initial 0 ( $P = 0.95$ , not  $P = .95$ ).

Typographical conventions follow *Scientific Style and Format*, 6<sup>th</sup> edition, by the Style Manual Committee of the Council of Biology Editors; Cambridge University Press (1999).

## ORGANIZATION

**Articles** should contain the following sections, in this order: Title, Author(s), Authors' affiliations (including e-mail for corresponding author), Abstract, Key words, Introduction, Methods, Results, Discussion, Acknowledgments, Literature Cited, Tables, Figure legends, and Figures. **Other types of manuscript** may use a different organization (e.g., a review or report could contain sections on various locations); however, the same formats for Literature Cited, Tables, and Figures will apply.

**Abstract**—An abstract is required for longer articles and suggested for short ones. It should contain essential information from each section of the text, without statistics. One or more additional abstract(s) may be provided in languages other than English.

**Key words**—Five to 10 words for use in computerized searching. Species names in both Latin and English should be included.

**Introduction**—Present the aims and significance of the work, and place it in the context of pre-existing information. State hypotheses that are being tested, if any.

**Methods**—Describe the methods, location, time, and personnel of the study. Include statistical methods, if any.

**Results**—Present results that are pertinent to aims given in the Introduction. Where feasible, summarize information and give the full data in Tables or Figures. Give sample sizes and the significance levels of statistical tests. Literature citations normally should not be in the Results section.

## INFORMATION FOR CONTRIBUTORS

**Discussion**—Summarize the results briefly, then evaluate the results, and develop their importance in relation to other work. Do not include primary results and statistical tests, which belong in Results.

**Text citations** should be “Surname year.” Two authors are “Surname and surname year”; 3 or more authors are “Surname et al. year” (but all authors should be given in the Literature Cited). E.g., (Pratt et al. 1987, Schreiber and Schreiber 1988). If appropriate, specify page number(s) in a book or long article (Pratt et al. 1987:32-34).

**Literature Cited**—List all references in alphabetical order of the authors’ surnames. Surname of the first author should be listed first, then initials; subsequent authors’ names should be listed as Initial(s), Surname. List all authors in the Literature Cited (do not use “et al.”). Year of publication follows, then title and journal reference. Include page numbers for all cited works, including the total number of pages in a book. Use standard abbreviations for journal titles; if you are unsure, spell them out. Spell out names of agencies and institutions.

The first line of each citation should be justified to the left margin; subsequent lines may be left-justified or indented. Do not use all-capital letters or italics in the Literature Cited, except that scientific names should be in italics. *Examples:*

Pratt, H.D., P.L. Bruner, and D.G. Berrett. 1987. A field guide to the birds of Hawaii and the tropical Pacific. Princeton University Press, Princeton, NJ. 409 pp.

Schreiber, E.A., and R.W. Schreiber. 1988. Great Frigatebird size dimorphism on two Central Pacific atolls. *Condor* 90:90-99.

Verify that all items in the Literature Cited are referenced in the article, and vice versa.

For articles that you read in a language other than English, list the citation in the original language. An English translation of the title [in brackets] is optional.

### Supporting materials

**Tables**—Tables should be numbered in the order they are first mentioned in the text. Refer to each table at least once. Use horizontal lines below the main heading(s); do not use vertical lines in tables. The Table (including its heading) should be comprehensible without immediate reference to the text. Data in Tables should not be repeated in the text, except to summarize.

**Figures**—Figures should be numbered in the order they are first mentioned in the text. Refer to each figure at least once. Figures should be drawn at least 50% larger than they will appear in print. Make all lettering, numbers, and symbols large enough to be read easily after they are reduced. The figure (including caption) should be comprehensible without immediate reference to the text. Define all symbols in a legend or the caption. Shading in figures should be black, white, or coarse cross-hatching; *do not use half-tone shading or background.*

For each figure, a high-quality graphics file or original drawing must be submitted with the final version of the

manuscript. Graphics files should be in TIFF (preferably), GIS, or EFS format, separate from the text document. A high-resolution JPG file may work; graphics in Word format are not acceptable.

**Photographs**—*Pacific Seabirds* occasionally publishes photos. The best ones are very sharp, with good detail and a range of dark/light values. Digital images submitted by e-mail must be at least 250 ppi (when reduced to publication size). The common low-resolution snapshot (often 72 ppi) does not reproduce well in publication; most cameras give the option of higher resolution. *Do not submit half-tone originals.* If the original is in color, submit it in that format; the editor will convert it to black and white.

**Art work**—Original art work is welcomed. The original or a high-resolution scan should be sent. Pen and ink drawings reproduce the most satisfactorily.

### REVISIONS AND PROOFS

Materials that are sent for peer review will be returned to the author, along with reviewers’ and editorial suggestions. If the Editor has accepted the article, he or she will endeavor to return the manuscript within 60 days. If the article needs major work, the author may be invited to revise and re-submit it for future acceptance.

For peer-reviewed articles, proofs will be mailed to the author before publication. Corrections should be returned within one week. Proofs of other materials will not be sent to the author unless he or she requests them.

# PUBLICATIONS OF THE PACIFIC SEABIRD GROUP

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The Pacific Seabird Group publishes symposia and other works. **PSG Symposia** are occasionally held at Annual Meetings; those which have been published are listed below. **Technical Reports** prepared by PSG working groups also are listed. *To order one of these PSG publications, please see instructions after each item.*

**Abstracts** of papers and posters given at PSG meetings are published annually. Abstracts for meetings of 1974 through 1993 appeared in the PSG Bulletin (Volumes 2–20); for meetings of 1994 through 2003, in Pacific Seabirds (Volumes 21–30); and for meetings of 1997 and later, at [www.pacificseabirdgroup.org](http://www.pacificseabirdgroup.org)

PSG publishes the journals *Pacific Seabirds* ([www.pacificseabirdgroup.org](http://www.pacificseabirdgroup.org)) and *Marine Ornithology* ([www.marineornithology.org](http://www.marineornithology.org)). Current and past issues of both journals are available online or by subscription. Back issues may be obtained online; those of Pacific Seabirds also are available from the PSG Treasurer (order form on last page).

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## SYMPOSIA

**SHOREBIRDS IN MARINE ENVIRONMENTS.** Frank A. Pitelka (Editor). Proceedings of an International Symposium of the Pacific Seabird Group, Asilomar, California, January 1977. Published June 1979 in Studies in Avian Biology, Number 2. *Available free of charge at* <http://elibrary.unm.edu/sora/Condor/cooper/sab.php>

**TROPICAL SEABIRD BIOLOGY.** Ralph W. Schreiber (Editor). Proceedings of an International Symposium of the Pacific Seabird Group, Honolulu, Hawaii, December 1982. Published February 1984 in Studies in Avian Biology, Number 8. *Available free of charge at* <http://elibrary.unm.edu/sora/Condor/cooper/sab.php>

**MARINE BIRDS: THEIR FEEDING ECOLOGY AND COMMERCIAL FISHERIES RELATIONSHIPS.** David N. Nettleship, Gerald A. Sanger, and Paul F. Springer (Editors). Proceedings of an International Symposium of the Pacific Seabird Group, Seattle, Washington, January 1982. Published 1984 as Canadian Wildlife Service, Special Publication. *Out of print; available free of charge at* [www.pacificseabirdgroup.org](http://www.pacificseabirdgroup.org)

**THE USE OF NATURAL VS. MAN-MODIFIED WETLANDS BY SHOREBIRDS AND WATERBIRDS.** R. Michael Erwin, Malcolm C. Coulter, and Howard L. Cogswell (Editors). Proceedings of an International Symposium at the first joint meeting of the Colonial Waterbird Society and the Pacific Seabird Group, San Francisco, California, December 1985. Colonial Waterbirds 9(2), 1986. \$12.00. *Order from:* Ornithological Societies of North America, PO Box 1897, Lawrence, Kansas 66044; phone (800) 627-0629; no online orders.

**ECOLOGY AND BEHAVIOR OF GULLS.** Judith L. Hand, William E. Southern, and Kees Vermeer (Editors). Proceedings of an International Symposium of the Colonial Waterbird Society and the Pacific Seabird Group, San Francisco, California, December 1985. Published June 1987 in Studies in Avian Biology, Number 10. \$18.50. *Available free of charge at* <http://elibrary.unm.edu/sora/Condor/cooper/sab.php>

**AUKS AT SEA.** Spencer G. Sealy (Editor). Proceedings of an International Symposium of the Pacific Seabird Group, Pacific Grove, California, December 1987. Published December 1990 in Studies in Avian Biology, Number 14. *Available free of charge at* <http://elibrary.unm.edu/sora/Condor/cooper/sab.php>

**STATUS AND CONSERVATION OF THE MARBLED MURRELET IN NORTH AMERICA.** Harry C. Carter, and Michael L. Morrison (Editors). Proceedings of a Symposium of the Pacific Seabird Group, Pacific Grove, California, December 1987. Published October 1992 in Proceedings of the Western Foundation of Vertebrate Zoology, Volume 5, Number 1. \$20.00. *Order from PSG Treasurer* (order form on last page), *or available free of charge at* [www.pacificseabirdgroup.org](http://www.pacificseabirdgroup.org)

**THE STATUS, ECOLOGY, AND CONSERVATION OF MARINE BIRDS OF THE NORTH PACIFIC.** Kees Vermeer, Kenneth T. Briggs, Ken H. Morgan, and Douglas Siegel-Causey (editors). Proceedings of a Symposium of the Pacific Seabird



## PSG PUBLICATIONS

Group, Canadian Wildlife Service, and the British Columbia Ministry of Environment, Lands and Parks, Victoria, British Columbia, February 1990. Published 1993 as a Canadian Wildlife Service Special Publication, Catalog Number CW66-124-1993E. **Order free of charge from:** Publications Division, Canadian Wildlife Service, Ottawa, Ontario, K1A 0H3, Canada.

**BIOLOGY OF MARBLED MURRELETS—INLAND AND AT SEA.** S. Kim Nelson and Spencer G. Sealy (Editors). Proceedings of a Symposium of the Pacific Seabird Group, Seattle, Washington, February 1993. Published 1995 in *Northwestern Naturalist*, Volume 76, Number 1. \$12.00. **Order from PSG Treasurer** (order form on last page), **or available free of charge at** [www.pacificseabirdgroup.org](http://www.pacificseabirdgroup.org)

**BEHAVIOUR AND ECOLOGY OF THE SEA DUCKS.** Ian Goudie, Margaret R. Petersen and Gregory J. Robertson (editors). Proceedings of the Pacific Seabird Group Symposium, Victoria, British Columbia, 8-12 November 1995. A special publication compiled by the Canadian Wildlife Service for the Pacific Seabird Group. Published 1999 as Canadian Wildlife Service Occasional Paper number 100, catalog number CW69-1/100E. **Order free of charge from:** Publications Division, Canadian Wildlife Service, Ottawa, Ontario, K1A 0H3, Canada, **or available free of charge at** [www.pacificseabirdgroup.org](http://www.pacificseabirdgroup.org)

**SEABIRD BYCATCH: TRENDS, ROADBLOCKS AND SOLUTIONS.** Edward F. Melvin and Julia K. Parrish (editors). Proceedings of an International Symposium of the Pacific Seabird Group, Blaine, Washington, 26-27 February 1999. Published 2001 by University of Alaska Sea Grant, Fairbanks, Alaska. Publication no. AK-SG-01-01. \$40.00. **Order from publisher.**

**BIOLOGY, STATUS, AND CONSERVATION OF JAPANESE SEABIRDS.** Nariko Oka (editor). Proceedings of an International Symposium of the Japanese Seabird Group and Pacific Seabird Group, Lihue, Hawaii, February 2001. *Journal of the Yamashina Institute of Ornithology* 33(2); Symposium (5 papers), pp 57-147, other papers pp. 148-213. In English with Japanese abstracts. \$75.00. **Order from PSG Treasurer** (order form on last page).

**OIL AND CALIFORNIA'S SEABIRDS.** Harry R. Carter (convener) and Anthony J. Gaston (editor). Proceedings of a Symposium of the Pacific Seabird Group, Santa Barbara, California, February 2002. Published 2003 in *Marine Ornithology* 31(1). **Available free of charge at** [www.marineornithology.org](http://www.marineornithology.org)

**THE BIOLOGY AND CONSERVATION OF THE AMERICAN WHITE PELICAN.** Daniel W. Anderson, D. Tommy King, and John Coulson (editors). Proceedings of a Symposium of the Pacific Seabird Group. *Waterbirds*, Volume 28. Special Publication 1, 2005. Published by the Waterbird Society. \$15.00. **Order from PSG Treasurer** (order form on last page).

**NEW! BIOLOGY AND CONSERVATION OF XANTUS'S MURRELET.** Harry R. Carter, Spencer G. Sealy, Esther E. Burkett, and John F. Piatt (editors). First part of the proceedings of a symposium of the Pacific Seabird Group, Portland, Oregon, January 2005. Published 2005 in *Marine Ornithology* 33(2):81-159. **Available free of charge at** [www.marineornithology.org](http://www.marineornithology.org)

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**Information on presenting symposia:** Pacific Seabird Group Symposia or Paper Sessions may be arranged by any member who is interested in a particular topic. Before planning a special session, refer to Meetings/Symposia Guidelines at [www.pacificseabirdgroup.org](http://www.pacificseabirdgroup.org); also contact the Coordinator of the Publications Committee and the Scientific Chair for the meeting.

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## TECHNICAL PUBLICATIONS

**EXXON VALDEZ OIL SPILL SEABIRD RESTORATION WORKSHOP.** Kenneth I. Warheit, Craig S. Harrison, and George J. Divoky (editors). Exxon Valdez Restoration Project Final Report, Restoration Project 95038. PSG Technical Publication Number 1. 1997. **Available free of charge at** [www.pacificseabirdgroup.org](http://www.pacificseabirdgroup.org)

**METHODS FOR SURVEYING MARBLED MURRELETS IN FORESTS: A REVISED PROTOCOL FOR LAND MANAGEMENT AND RESEARCH.** Pacific Seabird Group, Marbled Murrelet Technical Committee. PSG Technical Publication Number 2. 2003. **Available free of charge at** [www.pacificseabirdgroup.org](http://www.pacificseabirdgroup.org)

# PACIFIC SEABIRD GROUP COMMITTEE COORDINATORS

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Committees do much of PSG's business, as well as the conservation work for which PSG is respected. The committees welcome (and need) participants; contact the coordinators for information.

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